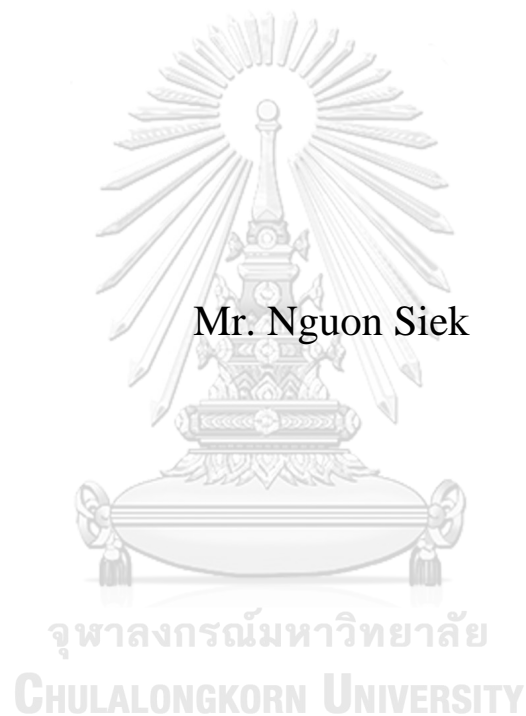


Academic Management Strategies of Secondary Schools in
Cambodia Based on the Concept of Innovation Leadership
Skills



Mr. Nguon Siek

A Dissertation Submitted in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy in Educational Management
Department of Educational Policy, Management, and Leadership
FACULTY OF EDUCATION
Chulalongkorn University
Academic Year 2022
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กลยุทธ์การบริหารวิชาการโรงเรียนมัธยมศึกษาในประเทศกัมพูชาตามแนวคิดทักษะความเป็นผู้นำ
ด้านนวัตกรรม



วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาครุศาสตรดุษฎีบัณฑิต
สาขาวิชาบริหารการศึกษา ภาควิชานโยบาย การจัดการและความเป็นผู้นำทางการศึกษา

คณะครุศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

ปีการศึกษา 2565

ลิขสิทธิ์ของจุฬาลงกรณ์มหาวิทยาลัย

Thesis Title	Academic Management Strategies of Secondary Schools in Cambodia Based on the Concept of Innovation Leadership Skills
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งาน เชือก : กลยุทธ์การบริหารวิชาการ โรงเรียนมัธยมศึกษาในประเทศกัมพูชาตามแนวคิดทักษะความเป็นผู้นำด้านนวัตกรรม. (Academic Management Strategies of Secondary Schools in Cambodia Based on the Concept of Innovation Leadership Skills) อ.ที่ปรึกษาหลัก : ศ. ดร. พุทธิ ศิริบรรณพิทักษ์, อ.ที่ปรึกษาร่วม : รศ. ดร. สุภัทญา แซ่ม้อย

การวิจัยครั้งนี้มีวัตถุประสงค์เพื่อ 1) ศึกษากรอบแนวคิดการบริหารวิชาการของโรงเรียนมัธยมศึกษาในประเทศกัมพูชาและทักษะความเป็นผู้นำด้านนวัตกรรม 2) ศึกษาระดับทักษะความเป็นผู้นำด้านนวัตกรรมของนักเรียน 3) วิเคราะห์จุดแข็ง จุดอ่อน โอกาส และภัยคุกคามของการบริหารวิชาการตามแนวคิดทักษะความเป็นผู้นำด้านนวัตกรรม และ 4) พัฒนากลยุทธ์การบริหารวิชาการตามแนวคิดทักษะความเป็นผู้นำด้านนวัตกรรม โดยใช้ระเบียบวิธีวิจัยผสมวิธีพหุระยะ ตัวอย่างวิจัยคือนักเรียน 2,662 คน ในขั้นตอนที่ 2 ผู้ตอบแบบสอบถามคือนักเรียน และโรงเรียนมัธยมศึกษาของรัฐรวม 94 แห่งในขั้นตอนที่ 3 ผู้ตอบแบบสอบถามประกอบด้วยผู้บริหารโรงเรียนและครูสอน เครื่องมือที่ใช้ในการวิจัย ได้แก่ แบบประเมินและแบบสอบถาม วิเคราะห์ข้อมูลโดยใช้ความถี่ ร้อยละ ค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐาน ดัชนีความต้องการจำเป็น (PNI_{modified}) และการวิเคราะห์เนื้อหา

ผลการวิจัยพบว่า 1) กรอบแนวคิดการบริหารวิชาการ ได้แก่ การพัฒนาหลักสูตร การเรียนการสอน การวัดและประเมินผล และกรอบแนวคิดทักษะความเป็นผู้นำด้านนวัตกรรม ประกอบด้วย 3 องค์ประกอบหลัก และ 15 องค์ประกอบย่อย ได้แก่ (1) วิสัยทัศน์และกลยุทธ์ด้านนวัตกรรม ประกอบด้วย การตระหนักวิสัยทัศน์ด้านนวัตกรรม การคิดเชิงกลยุทธ์ และการบริหารความเสี่ยง (2) การคิดเชิงนวัตกรรม ประกอบด้วย การแสดงความอยากรู้อยากเห็น การพัฒนาความเห็นอกเห็นใจต่อผู้อื่น การแสวงหาโอกาส การทำลายสมมติฐาน การคิดเชิงรุก การระดมความคิด การส่งเสริมความคิด และการนำความคิดไปใช้ (3) การยอมรับและสนับสนุนนวัตกรรม ประกอบด้วย ความเป็นผู้นำอย่างกล้าหาญ ความเป็นผู้นำแบบอย่าง การส่งเสริมวัฒนธรรมความไว้วางใจ และการยอมรับนวัตกรรม 2) ทักษะความเป็นผู้นำด้านนวัตกรรมของนักเรียนในภาพรวม อยู่ในระดับสูง โดยการยอมรับและสนับสนุนด้านนวัตกรรมมีคะแนนเฉลี่ยสูงสุด และการคิดเชิงนวัตกรรมมีคะแนนเฉลี่ยต่ำสุด องค์ประกอบย่อยทั้ง 15 องค์ประกอบ อยู่ในระดับสูง ยกเว้นการส่งเสริมความคิด ซึ่งอยู่ในระดับปานกลาง 3) จุดแข็ง คือ การพัฒนาหลักสูตร จุดอ่อน คือ การเรียนการสอนและการวัดผลและประเมินผล โอกาส คือ การเมืองและนโยบายของรัฐ ภาวะคุกคาม คือ สภาพเศรษฐกิจ สภาพสังคมวัฒนธรรม และสภาพเทคโนโลยี 4) กลยุทธ์การบริหารวิชาการตามแนวคิดทักษะความเป็นผู้นำด้านนวัตกรรม ประกอบด้วย 3 กลยุทธ์หลัก 6 กลยุทธ์รอง และ 28 วิธีดำเนินการ กลยุทธ์หลักที่ 1 คือ ออกแบบหลักสูตรใหม่เพื่อพัฒนาทักษะความเป็นผู้นำด้านนวัตกรรมของนักเรียน มี 2 กลยุทธ์รอง ได้แก่ (1) ออกแบบผลลัพธ์การเรียนรู้ที่พึงประสงค์ที่มีอยู่ใหม่กับทักษะความเป็นผู้นำด้านนวัตกรรมเกี่ยวกับวิสัยทัศน์และกลยุทธ์ด้านนวัตกรรม การยอมรับและสนับสนุนนวัตกรรม และการคิดเชิงนวัตกรรมในแต่ละกลุ่มสาระของหลักสูตรโรงเรียน (5 วิธีดำเนินการ) และ (2) ส่งเสริมการใช้ผลการเรียนรู้ในการพัฒนารายวิชาและตำราเกี่ยวกับทักษะความเป็นผู้นำด้านนวัตกรรมเกี่ยวกับวิสัยทัศน์และกลยุทธ์ด้านนวัตกรรม การรับรู้และการสนับสนุนนวัตกรรมและการคิดเชิงนวัตกรรม (4 วิธีดำเนินการ) กลยุทธ์หลักที่ 2 คือ พลิกโฉมการเรียนการสอนเพื่อพัฒนาทักษะความเป็นผู้นำด้านนวัตกรรมของนักเรียน มี 2 กลยุทธ์รอง ได้แก่ (1) พลิกโฉมกิจกรรมการเรียนรู้ในห้องเรียนและนอกห้องเรียนเพื่อพัฒนาทักษะความเป็นผู้นำด้านนวัตกรรมของนักเรียนโดยเน้นทักษะด้านวิสัยทัศน์และกลยุทธ์ด้านนวัตกรรม การคิดเชิงนวัตกรรม และการยอมรับและการสนับสนุนนวัตกรรม (4 วิธีดำเนินการ) และ (2) พัฒนาสื่อและแหล่งการเรียนรู้เพื่อพัฒนาทักษะความเป็นผู้นำด้านนวัตกรรมของนักเรียนโดยเน้นทักษะด้านวิสัยทัศน์และกลยุทธ์ด้านนวัตกรรม การคิดเชิงนวัตกรรม และการยอมรับและการสนับสนุนนวัตกรรม (4 วิธีดำเนินการ) กลยุทธ์ที่ 3 คือ ปรับปรุงการวัดและประเมินผลเพื่อพัฒนาทักษะความเป็นผู้นำด้านนวัตกรรมของนักเรียน มี 2 กลยุทธ์รอง ได้แก่ (1) พัฒนาเครื่องมือวัดและประเมินผลการเรียนรู้ของนักเรียนที่กำหนดไว้ในหลักสูตรที่เกี่ยวข้องกับทักษะความเป็นผู้นำด้านนวัตกรรมโดยเน้นวิสัยทัศน์และกลยุทธ์ด้านนวัตกรรม การคิดเชิงนวัตกรรม และการยอมรับและการสนับสนุนนวัตกรรม (3 วิธีดำเนินการ) และ (2) ส่งเสริมการประเมินนักเรียนเกี่ยวกับผลการเรียนรู้ด้านทักษะความเป็นผู้นำด้านนวัตกรรมโดยมุ่งเน้นวิสัยทัศน์และกลยุทธ์ด้านนวัตกรรม การคิดเชิงนวัตกรรม และการยอมรับและการสนับสนุนนวัตกรรม (8 วิธีดำเนินการ)

สาขาวิชา บริหารการศึกษา
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6281003227 : MAJOR EDUCATIONAL MANAGEMENT

KEYWORD: Academic Management, Innovation Leadership Skills, Secondary School, Strategic Management

Nguon Siek : Academic Management Strategies of Secondary Schools in Cambodia Based on the Concept of Innovation Leadership Skills. Advisor: Prof. PRUET SIRIBANPITAK, Ph.D. Co-advisor: Assoc. Prof. SUKANYA CHAEMCHOY, Ph.D.

This study aimed to 1) study conceptual frameworks of academic management of secondary schools in Cambodia and innovation leadership skills, 2) study students' innovation leadership skills levels, 3) analyze strengths, weaknesses, opportunities, and threats of academic management based on the concept of innovation leadership skills, and 4) develop academic management strategies based on the concept of innovation leadership skills. Multiphase mixed-methods design were employed. Samples included 2,662 students as respondents in Phase II and 94 public secondary schools in Phase III. Respondents included school administrators and teachers. Research instruments included evaluation forms and questionnaires. Data were analyzed using frequency, percentage, mean, standard deviation, modified priority need index ($PNI_{modified}$), and content analysis.

Results showed that 1) conceptual framework for academic management included curriculum development, teaching and learning, and measurement and evaluation and conceptual framework for innovation leadership skills consisted of three dimensions and 15 subdimensions: (1) innovation vision and strategy including realizing innovation vision, strategic thinking, and managing risks; (2) innovative thinking including demonstrating curiosity, developing empathy for others, opportunity exploration, assaulting assumptions, proactive thinking, idea generation, idea championing, and idea application; (3) innovation recognition and support including leading courageously, leading by example, promoting culture of trust, and recognizing the innovators. 2) Innovation leadership skills level was at the high level in the overall aspect. Innovation recognition and support and innovative thinking had the highest and lowest mean scores. All 15 subdimensions were at the high level, except for idea championing, which was at the moderate level. 3) Curriculum development was the strength; teaching and learning and measurement and evaluation were the weaknesses. Political-legal factor was the opportunity. Economic, sociocultural, and technological factors were the threats. 4) There were three strategies, six substrategies, and 28 procedures. First strategy was redesign the curriculum to develop students' innovation leadership skills consisting of two substrategies: (1) redesign the existing expected learning outcomes with innovation leadership skills regarding innovation vision and strategy innovation recognition and support, and innovative thinking across the disciplines of the school curriculum (5 procedures) and (2) promote the use of learning outcomes in subject development and textbooks related to innovation leadership skills (4 procedures). The second strategy was transform teaching and learning to develop student innovation leadership skills comprising (1) transform in-classroom and out-classroom learning activities to develop student innovation leadership skills (4 procedures) and (2) develop learning media and resources to develop student innovation leadership skills (4 procedures). The third strategy was improve measurement and evaluation to develop student innovation leadership skills including (1) develop measurement and evaluation tools on student learning outcomes set in the curriculum related to innovation leadership skills (3 procedures) and (2) promote student assessment on learning outcomes in innovation leadership skills (8 procedures).

CHULALONGKORN UNIVERSITY

Field of Study: Educational Management
Academic Year: 2022

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Co-advisor's Signature

ACKNOWLEDGEMENTS

First of all, I would like to humbly express my sincere gratitude to Her Royal Highness Maha Chakri Sirindhorn for giving me an unparalleled opportunity to pursue my doctoral degree under Royal Scholarship under Her Royal Highness Princess Maha Chakri Sirindhorn Education Project to the Kingdom of Cambodia.

I would also like to extend my deepest thanks to the royal steering committee and Faculty of Education, Chulalongkorn University, for giving advice and taking care of me during my study and throughout this research process.

My heartfelt thanks must be given to my mother, brothers, sisters, and relatives who emotionally support and motivate me to make this endeavor possibly complete.

I would like to give my special and deepest thanks to my advisor, Professor Pruet Siribanpitak, and co-advisor, Associate Professor Sukanya Chaemchoy, who provided me with excellent assistance, motivation, and patience throughout this challenging project. Without their tireless efforts towards my perseverance, I would indeed not complete this dissertation.

I am grateful to my dissertation committee for their dedication to my achievements and constant support. I respectfully thank H.E. Dr. ChuonNaron Hang, Minister of Education and the committee chairman, for inspiring me to pursue my doctoral study, for supporting me when issuing the permission letter for data collection, for being a role model for all education staff, and for giving comments and recommendations to improve this dissertation. Thank you, Associate Professor Chayapim Usaho, Ph.D, Assistant Professor Nantararat Charoenkul, Ph.D, and Dr. Penvara Xupravati, for giving recommendations to make this research better.

I am deeply indebted to my seniors, H.E. Kimcheang Hong, Ph.D, H.E. Seang Pech, Ph.D, Dr. Chantheng Meak, and Dr. Chanchhaya Chhouk, who helped me with their great ideas and were involved in most parts of the research project.

Last but not least, I would like to thank my research participants and everybody for making this research project possible.

Nguon Siek

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CHAPTER 1

INTRODUCTION

1.1 Background and Significance of the Study

As the world is surrounded by disruptive innovation, a sustainable knowledge society is driven through innovation. This change is more wholly characterized as the “Idea Economy” or “Innovation-Driven Economy.” Innovation is a strategy in the competitive business and a trendy topic in daily life routine. Citizens in the world's wealthiest countries have grown to believe that their economies are built on innovation (Stiglitz, 2014). In the idea economy, in which ideas are traded, anybody with an idea may contact a business or a talented entrepreneur to implement the innovation (Weiers, 2014). For national development, a nation needs to prepare citizens for having essential skills in innovation. Notably, in the labor market, employers in the idea economy dramatically look for innovative graduates, reported by the Association of American Colleges and Universities (AAC&U, 2018). In a current poll of employing managers from different economic sectors conducted by AAC&U, two-third of hiring managers claimed that creativity and innovativeness were essential skills for recent graduates.

In Cambodia, to make a vision of turning into an upper-middle-income nation by 2030 as well as a high-income nation by 2050 into reality, Royal Government of Cambodia (2018) imposes the Rectangular Strategy Phase IV that prioritizes human resources development. Promoting the innovation capacity, the Ministry of Education, Youth and Sport (MoEYS) develops research funds and capacity building (MoEYS, 2019b).

The National Strategic Development Plan (NSDP) 2019-2023, Sustainable Development Goal 4 (SDG) 2030, the Rectangular Strategy Phase IV, and Cambodia's Education 2030 Roadmap support the vision (MoEYS, 2019a; Royal Government of Cambodia, 2018, 2019; United Nations, n.a). Two educational policies for medium-term period are established: guarantee quality education that is inclusive and equitable, and encourage opportunities for everyone to continue learning and ensure efficient management and leadership of education staff at all levels (MoEYS, 2019b). Under the second education policy, one of the strategies is to promote entrepreneurial spirit, self-employment promotion, employment access and business-tailored services, and labor market knowledge to foster innovative and creative thinking practices (MoEYS, 2019b). This strategy consists of several actions: training in entrepreneurship through Community Based Enterprise Development (CBED) and Knowledge about Business (KAB); providing counseling and access to employment information for young people; organizing employment and entrepreneurship fora; organizing competition programs for young entrepreneurs.

In a slide presentation of ChuonNaron Hang, Minister of Education, on January 27, 2020, Cambodian basic education highlights the importance of literacies in the digital age, guided by some scholars such as Anderson and Krathwohl (2001) and Chaemchoy (2019). They include 3Rs, 8Cs, and 2Ls. 3Rs are reading, writing and arithmetic. 8Cs include problem-solving and critical thinking skills, creative and innovative thinking, intercultural understanding, collaboration, leadership skills and teamwork, communications, information, and media literacy, computing and information and communication Technology (ICT) literacy, career and learning skills, and change. 2Ls comprise learning skills and leadership. As a result, the curriculum

framework for general and technical education emphasizes eight essential competencies of the students: 1) writing and arithmetic, 2) foreign languages, 3) information and communication technology, 4) collaboration and teamwork, 5) creativity and innovation, 6) knowledge and skill application, 7) development of family and society, and 8) leadership and entrepreneurship (MoEYS, 2015). One of these student outcomes is creativity and innovation. It is time for Cambodian education to thrive on developing young people to be innovative.

For the last decade, Cambodian education recognizes its development under the reform period (2014 onward), led by Doctor ChuonNaron Hang, Minister of Education, especially New Generation School (NGS) program. Given autonomy with accountability, NGS can make some flexible adjustments of the curriculum and use innovative teaching methods to promote critical thinking and problem-solving skills of the students. This development explains that Cambodian education intends to develop students to have higher-order skills.

Several previous studies in the literature attempted to study an innovator's skills, including creative and innovative thinking skills (Sripour, 2018), innovator competencies (Chaemchoy, 2020; Wongtienlai, 2019), innovative entrepreneurship skills (Thepsena, 2021), and innovation capacities (Selznick & Mayhew, 2018). However, being an innovator is not sufficient. Students need to be equipped with leadership skills too. Literature highlights a relationship between leadership and innovation. To foster innovation, a leader must have leadership skills. Therefore, the concept of innovation leadership skills emerges.

Innovation leadership skills are a new construct, suggested by several scholars (e.g., Graham-Leviss, 2016; Gross, 2017; Jovana, 2020; Tucker, 2017). The construct

has recently gained attention from many scholars and researchers. Becoming innovation leaders is a key success to every organization, and they are required to demonstrate their innovation leadership skills. Graham-Leviss (2016) suggested five innovation leadership skills that innovation leaders have in common: risk management, curiosity demonstration, courageous leading, grasping opportunities, and keeping a strategic business view. Gross (2017) also proposed five innovation leadership skills for every innovation leader, including managing risk, identifying the opportunity, thinking with a strategic perspective, generating ideas, and putting action first. Tucker (2017) wrote in a popular magazine, “Forbes,” about six innovation leadership skills everyone needs to master. They consist of constantly adopting the opportunity mode of thinking, being adept at challenging assumptions, creating empathy for the ultimate customer, proactively thinking ahead of the time, continuously enriching your idea factory, and being adept at building the buy-in. Recently, Jovana (2020) suggested five top skills for innovation leadership—the source of innovation vision, innovative thinking, leading by example, promoting a culture of trust, and recognizing the innovators. In recent years, in order to create the next generation of innovation leaders, academic institutions all over the world have created a variety of educational programs. (Banerjee & Ceri, 2016). Everyone, especially young people, needs to master innovation leadership skills for either creating their own businesses or competing in the labor market.

Education should mold and equip young minds for innovation leadership (Banerjee & Ceri, 2016). The current study argues that developing students’ innovation leadership skills should start from basic education, especially at the secondary level. It is necessary to equip the students with innovation leadership skills

before they go to university. Dempster and Lizzio (2007) called for research on leadership in students in secondary schools rather than adult leadership in positions. They claimed that most crucially, it is necessary to distinguish between imposed ideals and emergent realities—analyzing student leaders as “who and what we would like them to be” rather than “who and what they are.” Youth leadership emphasizes “the group, the moment, and the situation” and values “mutual, shifting, and emerging” leadership, according to Dempster and Lizzio. This notion can be called “wisdom in spontaneity” contrary to “wisdom through experience” accounts of adult leadership (Roach, 1999, as cited in Dempster & Lizzio, 2007).

Leadership in young people contributes to education for civic society or civic renewal (i.e., a process depending on a new wave of student voice (Fielding, 2004, as cited in Dempster & Lizzio, 2007), as well as cultural and social exchanges and community services.

Two of the 15 reforms of the MoEYS focus on twelfth-grade examination and curriculum and textbooks. Therefore, secondary education should be prioritized in developing the innovation leadership skills of the students.

Developing student outcomes requires a certain type of school management. School management can be viewed into four areas: academic management, budget management, personnel management, and general management according to the Education Act 1999 of Thailand. Among these, academic management is considered directly supportive of developing students’ learning outcomes. Academic management typically covers curriculum development, teaching and learning, and measurement and evaluation.

Specific kinds of curriculum contribute to developing innovation leadership skills of the students, such as innovation hub curriculum and interdisciplinary curriculum. An innovation-hub curriculum is a hands-on curriculum embracing activities and exercises to promote creativity of individuals and group (Bodolica & Spraggon, 2021). An interdisciplinary curriculum is an approach that can assist students in acquiring the necessary content abilities to enhance some fundamental competencies, including imagination and problem-solving skills (Grady, 1994). Innovation leadership skills are considered educationally sound learning outcomes to be included in the curriculum. Therefore, content and learning experience selection should move from being disciplinary to interdisciplinary.

In addition to the curriculum angle, teaching and learning are considered impactful approaches to developing students' innovation leadership skills within a set curriculum framework. Various teaching and learning approaches are highlighted to foster innovation leadership skills of the students. Hands-on or experiential learning is recognized as a critical learning approach to developing innovation leadership skills. Experiential learning can be viewed explicitly as project-based learning, problem-based learning, collaborative or cooperative learning, and service-learning. When students engage in these types of learning, they acquire the skills necessary to unravel real-world issues in their society and community. At the same time, they make a change and even co-create innovation as a solution to meet societal and community needs.

In terms of measurement and evaluation, an authentic assessment is a key to assessing learning outcomes—innovation leadership skills. The authentic assessment concerns tasks or activities that individuals do in the real world. One goal of the

authentic assessment is to examine the degree to which a student's knowledge and skills can be applied beyond the classroom (Burrack, 2018). According to Burrack, some examples of authentic assessments consist of role plays and simulations, laboratory experiments, application letters, budget proposals, and other real-life problem-solving tasks.

Therefore, academic management is crucial for enhancing students' innovation leadership skills through hands-on curriculum, hands-on or experiential learning and authentic assessment.

In the literature, previous studies focused on school management and academic management that enhance creative and innovative thinking skills, innovator competencies, innovative entrepreneurial skills, and innovation capacities of the students. However, very few studies focused on the academic management that fosters students' innovation leadership skills. For instance, Boonkua et al. (2020) studied private primary school management strategies for enhancing the innovative leadership of the students. Therefore, this study aims to study academic management strategies of secondary schools based on the concept of innovation leadership skills.

1.2 Research Questions

1. What are conceptual frameworks of secondary schools' academic management and innovation leadership skills?
2. What are innovation leadership skills levels of secondary school students?
3. What are strengths, weaknesses, opportunities, and threats of secondary schools' academic management based on the concept of innovation leadership skills?
4. What are academic management strategies of secondary schools based on the concept of innovation leadership skills?

1.3 Research Objectives

1. To study conceptual frameworks of academic management of secondary schools and innovation leadership skills
2. To study innovation leadership skills levels of secondary school students
3. To analyze strengths, weaknesses, opportunities, and threats of secondary schools' academic management based on the concept of innovation leadership skills
4. To develop academic management strategies of secondary schools based on the concept of innovation leadership skills

1.4 Definition of Terms

The following terms are operationally defined to clarify their meaning and use in the study.

Innovation leadership skills: skills of an individual uses by herself/himself or through others to influence others and make change or innovation, consisting of realizing innovation vision, strategic thinking, managing risk, demonstrating curiosity, developing empathy for others, opportunity exploration, assaulting assumptions, idea generation, idea championing, idea application, proactive thinking, leading courageously, leading by example, promoting a culture of trust, and recognizing innovators.

Realizing innovation vision: the ability to define and convey the innovation strategy to members, as well as build it into reality.

Strategic thinking: the ability to perform the environmental analysis and seek learning opportunities in areas considered strategic, as well as bring a strategic perspective to the innovation process.

Managing risk: the ability to identify blind spots missed previously and formulate plans to avert the risk.

Demonstrating curiosity: the ability to keep knowledge and skills current and actively take the initiative to learn new information, demonstrating engagement and loyalty to goals.

Developing Empathy for others: the ability to understand the end user's problems and what they want to accomplish.

Opportunity exploration: the ability to identify new opportunities and/or a problem needed to be solved.

Assaulting assumptions: the ability to move beyond habitual thinking blocks and continuously challenge the status quo and personal, professional, and industry assumptions.

Proactive thinking: the ability to illuminate emerging trends and turn them into new opportunities by understanding and analyzing the developments applied to their own environment.

Idea generation: the ability to use own novel thinking capabilities and support members to generate ideas on innovation through various techniques.

Idea championing: the ability to sell a new idea through personal commitment, persuasive communication, as well as potential alliances.

Idea application: the ability to bring the new supported idea into practice and make innovation a regular part of daily operation.

Leading courageously: the ability to lead with confidence and authority, accept responsibility for making challenging decisions, engage and maintain audience

attention in high-stakes meetings and discussions, as well as do not avoid conflicts and differences of opinion.

Leading by example: the ability to act as a role model and unconventionally related to innovation that causes members to engage in such behaviors.

Promoting a culture of trust: the ability to believe in members and embrace failure on innovation, as well as eliminate challenges to innovation creation faced by members.

Recognizing the innovators: the ability to use a reward system for contributing to innovation.

Secondary school: public schools under the jurisdiction of the Ministry of Education, Youth and Sport (MoEYS), consisting of Lycee (grade 7-12) and Lycee (grade 10-12).

Academic management: Curriculum development, teaching and learning, and measurement and evaluation to develop the students' innovation leadership skills.

Curriculum development: Identifying learning outcomes in the curriculum and using learning outcomes in subject development to develop the students' innovation leadership skills.

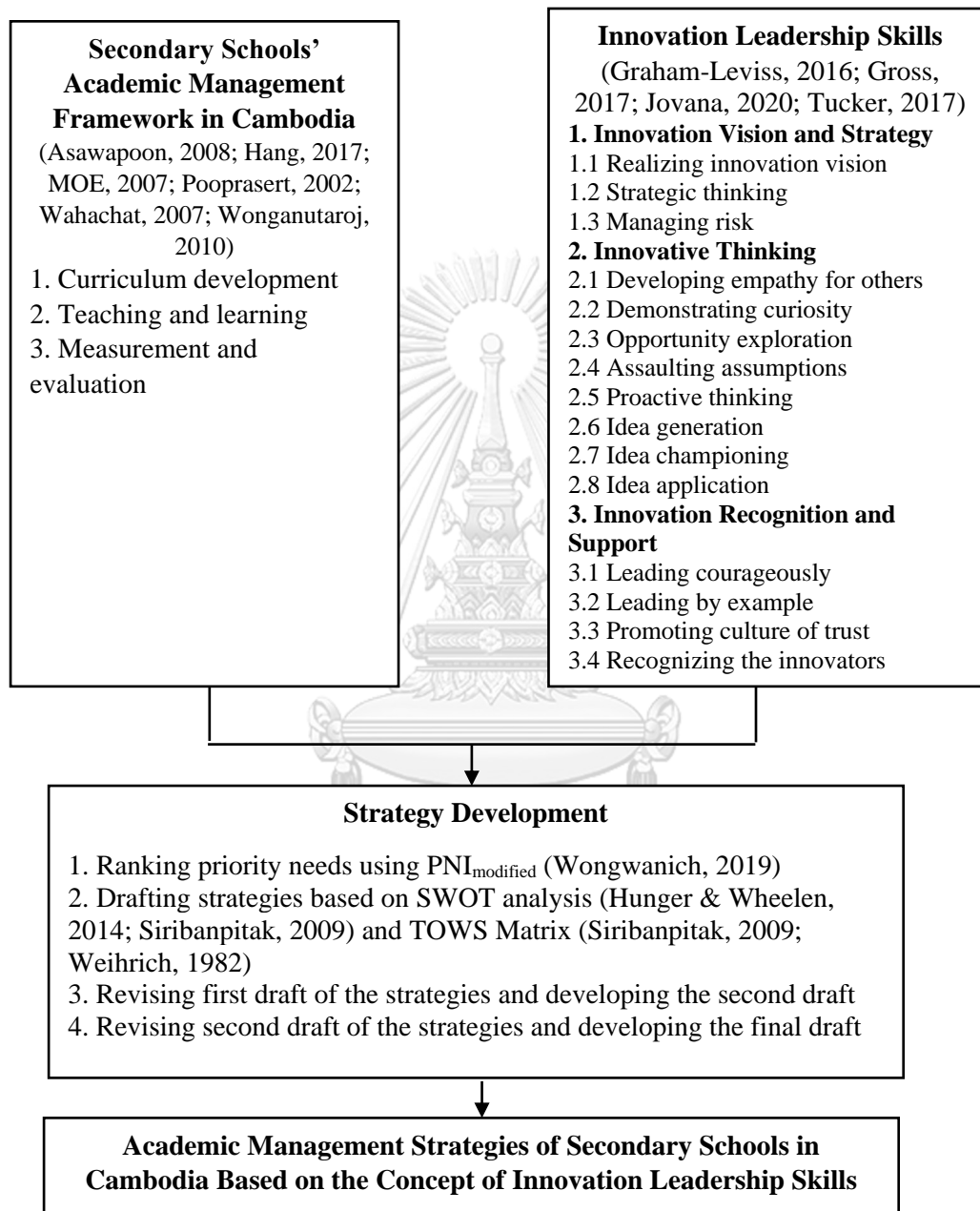
Teaching and learning: Using learning media and resources and organizing learning activities to develop the students' innovation leadership skills.

Measurement and evaluation: Setting evaluation criteria and constructing measuring tools and assessing learning outcomes to develop the students' innovation leadership skills.

Academic management strategies: proactive approaches to academic management based on strengths, weaknesses, opportunities, and threats (SWOT).

1.5 Conceptual Framework of the Study

There are two variables in the conceptual framework of the research study. They are academic management and innovation leadership skills. Academic management is conceptualized from various sources, including Asawapoom (2008), Hang (2017), MOE (2007), Pooprasert (2002), Wahachat (2007), and Wonganutaroj (2010). Academic management includes three components: curriculum development, teaching and learning, and measurement and evaluation. The construct of innovation leadership skills is conceptualized from different sources—Graham-Leviss (2016), Gross (2017), Tucker (2017), and Jovana (2020). Innovation leadership skills consist of realizing innovation vision, strategic thinking, managing risk, curiosity, empathy, opportunity exploration, assaulting assumptions, proactive thinking, idea generation, idea championing, idea application, leading courageously, leading by example, promoting culture of trust, and recognizing the innovators (see Chapter 2 for details). Figure 1 provides a complete summary of the conceptual framework of the study.

Figure 1*Conceptual Framework of the Study*

1.6 Scope of the Study

The population of the study was 554 public secondary schools under the jurisdiction of the Ministry of Education, Youth and Sport (MoEYS), according to MoEYS (2021b).

In this study, variables were academic management and innovation leadership skills. Academic management consisted of curriculum development, teaching and learning, and measurement and evaluation. Innovation leadership skills included realizing innovation vision, strategic thinking, managing risk, developing empathy for others, demonstrating curiosity, opportunity exploration, assaulting assumptions, proactive thinking, idea generation, idea championing, idea application, leading courageously, leading by example, promoting a culture of trust, and recognizing the innovators.

This study was conducted from February 2022 to December 2022 during the COVID-19 era.

1.7 Expectations of the Study

The expectations of this study are divided into academics and practices as follows.

1.7.1 Academics

As the literature heavily places on the innovation-related abilities (not innovation leadership skills) and lacks innovation leadership skills of the students, especially at the basic education level, the present study explores a conceptual framework for secondary school students' innovation leadership skills.

Only one study focused on the innovative leadership of the students. Nevertheless, such a study emphasized private primary schools. Therefore, the current

study results yield the secondary schools and provide empirical evidence on students' innovation leadership skills. In addition, the researchers can use the findings for further research related to secondary school students' construct of innovation leadership skills.

This study's key finding is the developed academic management strategies for enhancing students' innovation leadership skills. The result contributes to new knowledge in academic management of secondary schools in a developing country and strategic management in the education setting.

1.7.2 Practices

The study results provide MoEYS with empirical evidence on levels of students' innovation leadership skills and academic management strengths and weaknesses. MoEYS use the data for preparing programs to eliminate weaknesses. The findings also help MoEYS design educational policies and the developed strategies to promote students' innovation leadership skills and/or integrate the developed strategies into the strategic plan of the MoEYS.

School directors use this study's results related to the innovation leadership skills scale to measure their students and utilize this assessment data to promote the innovation leadership skills of the students. Moreover, school directors will adopt the developed strategies and adjust them as appropriate in their contexts.

Teachers use this study's results to improve their teaching practices and engage in academic management for developing innovation leadership skills of the students.

Students use the current study results regarding their innovation leadership skills to improve their weak skills and strengthen their strong skills. Students will be beneficiary when schools implement the developed strategies.

Higher education institutions may use the findings of this study regarding levels of students' innovation leadership skills to prepare learning experiences for their first-year students.



CHAPTER 2

REVIEW OF THE LITERATURE

This study aimed at studying conceptual frameworks of secondary schools' academic management and innovation leadership skills; studying levels of innovation leadership skills of the students; analyzing strengths, weaknesses, opportunities, and threats of secondary schools' academic management based on the concept of innovation leadership skills; and developing secondary schools' academic management strategies in Cambodia based on the concept of innovation leadership skills. The literature review addresses six main areas. These areas include innovation and leadership for national development; innovation leadership skills; secondary schools and student leadership development; academic management and innovation leadership development; strategy development; and related research and studies.

The first section reviews general conceptions of innovation and leadership separately. Different leadership styles facilitating innovation are also examined. Leadership for innovation is essential for national development across its dimensions. The second part of the literature review is definitions and components of innovation leadership skills. The synthesis of innovation leadership skills studied by various researchers and scholars is conducted to build a preliminary conceptual framework of innovation leadership skills utilized in this study. The third part of the literature review illustrates how secondary schools promote development of student leadership. The next part of the literature review is a review of academic management and innovation leadership skills development, including definitions and components of academic management at the school level, as well as how academic management can enhance students' innovation leadership skills, including effective approaches to

innovation leadership skills development. The synthesis of academic management components is carried out to develop a preliminary conceptual framework of academic management used in this study. The concepts of backward-design curricular and outcome-based education are additionally reviewed in the curriculum section. The fifth part of the literature explores strategy development concepts. Finally, related research section is traced as it is useful for understanding what has already been studied.

2.1 Innovation and Leadership for National Development

National development is deemed as technology advancement, economic growth, individual earnings, poverty reduction, development of healthy families, values creation and sharing, learning the citizenship responsibilities, and improvement of the quality of life (Adams, 2002). Fagerlind and Saha (1989) broadly viewed as three dimensions: the economic, political, and cultural-ideological. Economic growth and social change are the major dimensions of national development. Adams reported that education contributes to economic growth by imparting skills and attitudes by enhancing health, diminishing fertility, and probably providing political steadiness. In his report, the demand for more and higher education grows as the economy develops and new technology is used for production. For example, language and computer abilities are required, along with lower secondary schooling.

National development is extended to newer terms—human and social dimensions, limited to physical infrastructure (Adams, 2002). His report revealed that individuals and institutions could contribute to social change with information and education. The social goals of education are generally ambitious and could include the development of a significant focus for students on social issues and institutions;

elimination of discrimination and reduction in elitism; promotion of national unity; co-operation between students; non-violent resolution of conflicts and self-confession development. According to the report, higher-order objectives like problem solving and creativity should be the focus of education because they are processes and are regarded as more enduring and broadly applicable forms of learning.

For national development in economic and social aspects, it is necessary to equip people with skills to foster innovation. Those skills may include leadership skills that stimulate innovation. The following subsections will present the innovation and leadership, as well as their relationship, in detail.

2.1.1 Innovation

One question that everyone needs to ask themselves in a rapidly changing world is, “How can everyone compete and/or survive in the changing world?” Innovation is the answer. Organizations, regardless of their types of business, strive to develop innovation for a competitive advantage. In the future economy, innovation is about how and when you can provide distinctive value, not merely creating (Tucker, 2017). Perri et al. (2019) agreed that innovation has grown to be more important for businesses, not only to provide novel ideas but also to make money of technology deemed services to offer consumer resolutions and address unmet needs. To enable innovation to occur, it may need leadership. Literature highlights the importance of leadership skills to enable innovation. The leader's role is crucial (Alsolami et al., 2016). Hunter and Cushenbery (2011) emphasized more on the leadership role in leading to new original ideas. They claimed that leaders play a vital role in fostering original thinking and directing the instantiation of those new ideas worthy of pursuing. This is how innovation leadership skills emerge. Before getting insight into

the concept of innovation leadership skills, the two key terms “innovation” and “leadership” need to be defined.

Innovation is a term that can be viewed in various aspects. Although the dictionary describes “innovation” as “change,”; it emanates from Latin “in” and “novare,” meaning “to make something new,” possibly a more helpful definition would be “the successful exploitation of new ideas” (Bessant & Tidd, 2015, p. 15). The following subsections will review the definition, types, and degrees of innovation.

1) Definition of Innovation

Speaking of the term “innovation,” it is fair to mention the originator of the concept. Joseph Schumpeter, an Austrian economist, was the main contributor to the topic of innovation and development. Innovation is “simply defined as the setting up a new production function” (Schumpeter, 1939, as cited in Noailles-Siméon, 2020). Kanter (1983), a Harvard scholar, broadly defined innovation as "bringing any new, problem-solving idea into use." She states that innovation generates, accepts, and implements new ideas, processes, products, or services (as cited in Shavinina & Seeratan, 2003). Many scholars have defined the term for purposes of their research and/or field in which they are.

Innovation is a multifaceted, interdisciplinary, and multidimensional construct that is hard to be accurately defined. However, the most cited, widely accepted definition of innovation is from the Oslo Manual developed by Organization for Economic Cooperation and Development (OECD). OECD/Eurostat (2005) defined innovation as “the implementation of a new or significantly improved product (good or service) or process, a new marketing method, or a new organizational method in

business practices, workplace organization or external relations” (p. 46). According to OECD (2016), this definition extended to the private sphere and can as well be employed to education with slight changes. Bessant and Tidd (2015) defined innovation as the process of transforming ideas into valuable new products, services, or processes.

Recently, some scholars defined innovation by reviewing the existing literature. For instance, Varadarajan (2018) built on extant definitions of innovation and incorporates some keywords such as value creation, utilization of resources and knowledge, and idea translation into the definition as “the creation of value by using relevant knowledge and resources for conversion of an idea into a new product, process, or practice or, improvements in an existing product, process, or practice” (p. 154). Webb (2019) defined innovation as creating a new value that reflects the company's mission and customers. In education, innovation involves three features: implementation, minimized time and resources, and stakeholder acceptance (Fuad et al., 2020).

There is an attempt to generalize the definition of innovation across different disciplines. In their article with more than 2,000 citations, Baregheh et al. (2009) conducted a content analysis of 60 definitions of innovation from various disciplines and suggested a diagrammatical definition in words as “innovation is the multi-stage process whereby organizations transform ideas into new/improved products, service or processes, in order to advance, compete and differentiate themselves successfully in their marketplace.

Most recently, Krasadakis (2020) has defined innovation on the purpose of innovation mode in his book. He views innovation as an outcome and opportunity.

Innovation as the outcome is similar to what OECD (2016) has defined. Innovation opportunity is defined as “a feasible, well-structured solution to a defined problem, with some novel aspects that are validated as highly probable value-drivers for a critical mass of users” (Krasadakis, 2020, p. 8). The above-mentioned definitions imply the main feature of innovation—implementation. As OECD (2016) emphasized, implementation refers to the putting on the market of a product or the real utilization of procedures, marketing strategies, and organizational techniques. In short, the key feature of innovation is bringing a novel idea into practice. According to the definitions of innovation, it classifies types of innovation. Therefore, the types of innovation are essential to elaborate for better understanding the concept of innovation.

2) Types of Innovation

Categorizing innovation is not constantly easy as it relies on the definition, the context, and the viewpoint (Krasadakis, 2020). Some many scholars, researchers, and practitioners thrive on exploring different kinds of innovation. According to Krasadakis, innovation classification can be considered on its aim (what innovation seeks to enhance) or intensity (how efficient and endless innovation is). Types of innovation (its targets) are discussed in this section. In contrast, types of innovation (their intensity or degree) are reviewed in the innovation degree section. This different review is to avoid confusion and carefully distinguish aspects of innovation.

For example, incremental and radical innovations are not considered types of innovation, but rather attributes of any innovation types, representing the degree of change innovation brings (Rowley et al., 2011). As mentioned early, the most acceptable source is OECD/Eurostat (2005). OECD/Eurostat (2005) identified four

kinds of innovation: product innovation, process innovation, marketing innovation, and organizational innovation. These innovations are the basic types of innovation. From several sources reviewed, more other types of innovation can be distinguished from the above four innovations and categorized into four types, including service, technical, business model, and institutional innovations. Therefore, there are totally eight types of innovation deriving from literature (Baregheh et al., 2009; Bessant & Tidd, 2015; Eirich, 2020; Krasadakis, 2020; Matthews & Brueggemann, 2015; OECD/Eurostat, 2005; Raffaelli & Glynn, 2015; Ulgen, 2020), as shown in Table 1.

Table 1

A Summary of Innovation Types

Types of innovation	Sources								Description	Examples
	1	2	3	4	5	6	7	8		
Product	√	√	√	√		√	√		Introduction of a product or service that is either new or greatly upgraded, including technical details, materials, software integration, and other functional qualities, with respect to its characteristics or intended uses.	A new design of the car, a new insurance package for accident-prone babies, and a new home-entertainment system
Process	√	√	√	√		√	√		The changes or implementation of a new or significantly improved production or delivery method for the provision of services and goods, including techniques, equipment and/or software.	Change in the manufacturing methods and equipment used to produce the care or the home-entertainment system, or in the office procedures and sequencing in the insurance case
Marketing /Position	√		√				√		The changes in the context in which products or services are introduced or implementation of a new marketing method involving significant changes in product design or packaging, product	A new market for ice cream, glucose-based drink relaunched as a health drink at the growing fitness market, Direct Marketing

Types of innovation	Sources								Description	Examples
	1	2	3	4	5	6	7	8		
									placement, product promotion, pricing, financing arrangements, or new sales approach.	
Organizational (including solutions, systems, managerial)	√			√		√	√		The generation and implementation of a new organizational method including patterns of collaboration and contribution, management practice, process, structure, or technique in the firm's business practices, workplace organization or external relations to further organizational goals. It consists of procedural and structural organizational innovations.	Creating databases of lessons learned, ideal practices, and other knowledge; education and training systems
Business Model/ Paradigm (including experience)			√	√			√		changes in the underlying mental models or the introduction of new logic to any of the components including or the whole model that allows the organization to pursue an opportunity, a specific line of service, or its overall purpose.	The shift to low-cost airlines, the provision of online insurance and other financial services, and the repositioning of drinks like coffee and fruit juice as premium designer products
Service		√				√			The offering of new services to the customers.	maintenance or operating services
Technical (including technological, digital)		√						√	The implementation of an idea or the use of digital technology for a new product or a new service or the introduction of new elements in an organization's production process or service operation, or during the process of innovating or as the description (fully or partly) of the outcome of the innovation process.	renewable energy, concentrated solar power
Institutional					√				A novel, useful and legitimate change that disrupts, to different degrees, the cognitive, normative or regulatory fundamentals of	Institution of marriage, employment contract, microfinance and other hybrid organizational forms

Types of innovation	Sources								Description	Examples	
	1	2	3	4	5	6	7	8			
										the organizational field. It resembles organizational innovations.	

Note. 1 = OECD/Eurostat (2005), 2 = Baregheh et al. (2009), 3 = Bessant and Tidd (2015), 4 = Matthews and Brueggemann (2015), 5 = Raffaelli and Glynn (2015), 6 = Ulgen (2020), 7 = Krasadakis (2020), 8 = Eirich (2020). The researcher's own illustration, adapted from eight sources mentioned in the table.

As shown in Table 1, those types of innovation focus on ready-made or ultimate innovation and at the organizational level. However, in innovation literature, some scholars are interested in innovation at the individual level called "individual innovation." This type of innovation fits with the student innovation that this study intends to explore. Therefore, before creating the types of innovation shown in Table 1, individual innovation must precede.

2.1) Individual Innovation

Vandervert (2003) viewed all innovations result from the cognitive process – working memory. Thus, the cerebellum's cognitive capabilities and the recursive collaboration of working memory constitute the primary evolutionary mechanism behind innovation, according to Vandervert. Agreeing with Vandervert on the cognitive perspective, Shavinina and Seeratan (2003) further categorized innovation as "individual innovation" or human innovation. Thus, individual innovation is an innovation that is related to cognition at the individual level.

Shavinina and Seeratan (2003) identified five levels of individual innovation which exists at the individual level, including innovation's underlying developmental principles (level 1), cognitive foundation (level 2), displays of intelligence (level 3); manifestations of metacognition (level 4); and manifestations of extracognition (level

5). The first level of individual innovation, the developmental foundation of innovation, involves the advanced childhood development of innovators that emerges at each age—or sensitive periods that hasten mental development of a child. The rapid and deep learning that is made possible by such accelerated development also promotes intellectual functioning, the production of novel and unique ideas, and ultimately the enhanced training of future innovators. The second level, the cognitive basis of individual innovation, refers to a particular arrangement of a person's cognitive experience consisting of three forms: conceptual structures (i.e., conceptual thinking), knowledge ground (i.e., prior relevant knowledge), and mental space (i.e., flexibility, differentiation, and integration).

These three forms determine distinctive intellectual worldview of innovators. The intellectual manifestations as the third level of individual innovation include intellectual production, individual differences in intellectual activity, and innovativeness. The fourth level of individual innovation, metacognitive manifestations, consists of regulatory processes and metacognitive awareness. Metacognitive awareness is defined as (a) a system of knowledge about the fundamental manifestations of intellectual activity in general and about one's own unique cognitive capabilities; (b) the capacity to assess the "strong" and "weak" aspects of one's own intellectual functioning, including the capacity to make up for one's own weaknesses and rely on strengths; and (c) the capacity to regulate one's mental work using a variety of stimulation techniques. The planning, directing, observing, and coordinating of one's own cognitive processes are all examples of regulatory processes (Kholodnaya, 1990; Shavinina & Kholodnaya, 1996, as cited in Shavinina & Seeratan, 2003). Finally, the fifth level of individual innovation (i.e.,

extracognitive manifestations) is displayed by particular interests, thoughts, and emotions that characterize innovators' mental work (Shavinina & Seeratan, 2003). As individual innovation focuses on thinking skills, it allows students to acquire these skills to become innovators in the future or even immediately in their schools.

However, as claimed by Krasadakis (2020) that innovation can be classified by its purpose (or types), it differs in different intensity (or degree). Therefore, the following subsection emphasizes common degrees of innovation.

3) Degrees of Innovation

Concerning its degree, innovation can be differently identified and named. Carayannis et al. (2003) proposed the innovation degrees, particularly technological innovation, according to four dimensions: process, content, context, and impact, as shown in Table 2.

Table 2

Four Dimensions of Innovation

Dimensions	Innovations			
	Evolutionary innovation		Revolutionary innovation	
Process				
Content	Incremental innovation	Generational innovation	Radical innovation	Architectural innovation
Context	Continuous innovation	Continuous innovation	Discontinuous innovation	Discontinuous innovation
Impact	Non-disruptive innovation	Disruptive innovation	Non-disruptive innovation	Disruptive innovation

Source: Adapted from Carayannis et al. (2003)

As shown in Table 2, innovation can be viewed as evolutionary versus revolutionary; incremental versus radical; and non-disruptive versus disruptive. Brown (2009) classified innovation degrees into incremental, evolutionary, and revolutionary innovations, meaning small, medium, and large improvements, respectively (Matthews & Brueggemann, 2015). Brown distinguished the three

innovations regarding four dimensions, including offerings, businesses, customers, and markets. Different from incremental innovation (characterized as “existing” in the four dimensions) and revolutionary innovation (characterized as “new” in the four dimensions), evolutionary innovation can be changed on the existing offerings/businesses with the new customers/markets (e.g., Tata Motor’s Nano) or creation of the new offerings/businesses with the existing customers/markets (e.g., Toyota Prius), according to Brown. Many scholars identified different degrees of innovation in favor of their fields of study and/or research purpose. For example, Christensen (1997) proposed a concept of disruptive innovation. However, disruptive innovation and revolutionary innovation can be deemed as radical innovation. At the same time, evolutionary innovation is regarded as incremental innovation. At this point, innovation degrees can be broadly seen as incremental and radical innovation.

In Schumpeter’s view, radical innovation causes big disruptions, whereas incremental innovation drives the change process consistently (as cited in OECD/Eurostat, 2005). For instance, incremental innovation may involve changing the materials used to make a product, enhancing it with a new design, or including more features or alternatives (Rowley et al., 2011). Although radical innovation, for example, labels “new-to-market” product, service, or process (Mosey, 2005; Oke et al., 2007), updating the design on the car (or incremental innovation) is different from creating a new concept automobile (or radical innovation) that includes an electric powertrain and is composed of innovative composite materials that are stronger than steel and glass (Bessant & Tidd, 2015). In addition, incremental innovation focuses on “doing what we do but better,” while radical innovation is “doing something completely different” (Bessant & Tidd, 2015, p. 32). Verganti (2009) points out that

incremental innovation is market-oriented (or user-centered); radical innovation is highly technological- and design-driven, as shown in Table 3.

Table 3

Design-Driven Innovation

Radical Technology	Technology push	<i>Technology/Design-driven</i>
Incremental Technology	Market pull (user centered)	<i>Design-driven</i>
	Incremental Values	Radical Values

Source: Adapted from Verganti (2009)

Creating innovation may not simply acquire an innovator's skills but also need leadership skills to complement. The following section reviews various types of leadership or leadership styles stimulating innovation.

2.1.2 Leadership

Effective innovation, with proper leadership, turns into a practical and attainable goal; but regardless of it, the obstacle can demonstrate overwhelming (Hunter & Cushenbery, 2011). Innovation needs clear direction and strategic leadership (Bessant & Tidd, 2015). To engage and lead staff in an innovation-friendly culture, leaders must learn new leadership skills (Barsh et al., 2008). Similarly, Deschamps (2003) emphasized that the literature and studies on innovation presented a divided image of leadership and innovation. Deschamps claimed that innovation might require a particular leadership profile. If this is the case, according to Deschamps, it is essential to learn how to identify and nurture innovation leaders in order to maximize their potential. Therefore, Vlok (2012) argues, it should be specifically concentrating on the convergence of innovation and leadership, or the strategic role which innovation leadership skills serve in organizations. Leaders are crucial in fostering original thought and directing the implementation of those innovative ideas that merit further investigation, according to Hunter and Cushenbery.

Leadership was rated as the best driver of innovation performance in a poll of 600 worldwide company executives, administrators, and professionals. People who said their company was more inventive than other firms in its sector gave it "strong" or "very strong" ratings for its leadership abilities. In contrast, people who thought their own organization's capacity for innovation was below average assessed that organization's leadership skills as much lower and, in some instances, as poor (Barsh et al., 2008). Thus, the leadership role is significant in facilitating innovation. Its direct and indirect effects can be examined. In the management field, research shows that Leadership can explain 50% of the variation in organizational performance, both directly and indirectly (Bessant & Tidd, 2015).

Scholars and researchers have studied the characteristics/attributes and/or skills of leaders that drive innovation. Gilley et al. (2008) found that four leadership skills, including coaching, communicating, motivating, and involving, explained 55% of the variance in leadership effectiveness in change implementation/innovation, while two other skills (i.e., rewarding and encouraging teamwork/collaboration) were not the predictors. Communicating is the highest influence predictor and includes giving feedback and reinforcement to others to ensure that they are motivated to adopt and handle change (Peterson & Hicks, 1996 as cited in Gilley et al., 2008). Motivation is also the second influence predictor, reflecting a leader's ability to support and reward new ideas (Leifer et al., 2000 as cited in Gilley et al., 2008). Involving is the ability to engage with others and provide a high level of support (Williams, 2001 as cited in Gilley et al., 2008). Coaching involves the ability to doubt the status quo, approach situations from a new viewpoint, and allow others to make mistakes and learn from them (Hudson, 1999 as cited in Gilley et al., 2008).

Specifically, Hunter and Cushenbery (2011) suggested that leadership skills influence directly and indirectly on innovation. Indirect leadership influence includes being a role model, recognition and rewards, employing and assembling a team, and creativity climate, while direct leadership influence consists of idea generation and creative input, vision and strategy, resource provision, and decision making. It seems that the indirect influence of leadership on innovation reflects how a leader can create a creative environment and engage the creative team to foster innovation within the organization. Putting innovation at the top agenda, leaders allocate necessary resources and even generate creative ideas directly for innovation growth.

Similarly, Vlok (2012) claims that leaders influence innovation success when they are strategists, capability builders, matchmakers, and achievers. Strategists demonstrate the ability to be role modeling, develop vision and strategy and make decision-making like the leadership skills identified by Hunter and Cushenbery. Strategic leaders also demonstrate original thinking that is consistent with what Hunter and Cushenbery call “creative input and idea suggestion.” As capability builders, leaders promote innovation-enhanced environment, learning and development, develop creative teams and even build and maintain high-impact networks, according to Vlok.

These skills are equivalent to rewards and recognition, hiring and team composition, and climate for creativity, identified by Hunter and Cushenbery. Leaders as matchmakers express the ability to understand the external environment, communicate clearly, and apply entrepreneurial thinking, as claimed by Vlok. Vlok described achiever leaders as those who motivate others to superior performance and even build a high-performance culture, as well as are result-oriented. Leadership

clarity is linked to consistent goals of team, high levels of commitment, commitment to excellence, and support for innovation (West et al., 2003). Regarding the indirect leadership influence, as mentioned above, leaders who make innovation happen to create a climate for their team to be creative. Climate factors enabling innovation are comprised of openness and trust, challenge and participation, innovation support and space, disagreement, and discussion, risk taking, and independence (Isaksen & Tidd, 2006). The role of leadership is to build these climate factors.

Recent studies have also highlighted the vital role of leadership in leading innovation (De Jong et al., 2020; Fullan, 2016; Torfing, 2019). De Jong et al. (2020) found that leaders leading collaborative innovation (i.e., innovation happens through relationship between school directors and teachers) act as a “team player” and a “facilitator” that include eleven leadership practices: bottom-up, top-down, engagement, assistance, encouragement, focus on vision, advancement, leading by example, student orientation, transparency, and connection. Characteristics or attributes of leadership mentioned above can be characterized by specific styles of leadership. Although literature highlights many different styles of leadership that stimulate innovation (e.g., authentic, ambidextrous, design, ecological, entrepreneurial, ethical, shared or distributed, strategic, visionary, and transformational leadership), only a few found to be effective and agreed by most scholars. They include transformational leadership and ambidextrous leadership. These two leadership styles will be discussed in detail in innovation leadership skills because they are adopted by innovation leaders, claimed by literature.

Therefore, national development requires innovation leadership skills of young people.

2.2 Innovation Leadership Skills

Even though the construct of innovation leadership skills is not a new phenomenon, it recently got attention from many scholars and researchers. It appeared in early 2000. The following section addresses various definitions and components of innovation leadership skills and the synthesis of the components for building a preliminary conceptual framework for this study.

2.2.1 Definitions of Innovation Leadership Skills

Literature links innovation leadership skills to change and innovation. This can be explained by Malloch (2010), claiming that a role of innovation leadership skills is essential to evaluate and combine the effects of the significant shifts in the organization's infrastructure in order to produce long-term organizational effectiveness; similarly, innovation leaders significantly perform in enabling the growth of innovations in an institution (Lang et al., 2018); they can create a climate that encourages creativity and leads to new ideas, as well as promote and direct group innovation (West et al., 2003). As this construct contains the word “leadership,” innovation leaders include supporting or encouraging others to make change and innovation.

As Van de Ven and Chu (1989) defined it, innovation leadership skills involve inspiring individual initiatives, elucidating individual accountability, offering strong and comprehensive feedback of performance evaluation, orienting a robust task, as well as highlighting excellent group relationships and trust among members in the organization (as cited in Carmeli et al., 2010). Gliddon (2006), in his doctoral dissertation, developed a competency model for innovation leaders. He operationally defines innovation leaders as innovators, early adopters, opinion leaders, or change

agents who participated in the creation or implementation of innovation. Malloch and Porter-O'Grady (2009) defined innovation leadership skills as the process of establishing the environment in which innovation can occur, including the roles, decision-making procedures, physical space, relations, networks, and tools that allow for creative thinking and experimentation (as cited in Malloch, 2010).

Similarly, Horth and Vehar (2012) defined innovation leadership skills as a process for establishing guidance, orientation, and commitment needed to make and execute a original or novel thing that creates value. Innovation leadership skills are the use of innovative thinking and the leadership that endorses it, as well as the key to discovering what's new, what's better, and what's next (Horth & Buchner, 2014). Recently, innovation leadership skills are defined as "the capacity to continually outperform normative techniques and to identify leverage points for delivering scaled transformations which generate new system behavior" (Banerjee & Ceri, 2016, p. vii). Innovation leadership skills entail two key elements of change, specifically, the capacity to increase impact and the capability to increase the system's innovation capacity (Banerjee & Ceri, 2016). Innovation leadership skills refer to synthesizing various leadership styles to influence others to generate creative ideas, products, services, and solutions (Gliddon, 2018). In the current study, innovation leadership skills are defined as critical leadership skills that an individual adopts or possesses to make a change or stimulate innovation through either himself or others.

2.2.2 Components of Innovation Leadership Skills

As mentioned early, innovation leaders play a crucial role in supporting creativity and innovation as well as making change. Mumford and Licuanan (2004) revealed that the ability of a leader to encourage creativity and innovation is

dependent on the leader's traits, which include technical and managerial experience as well as creative thinking abilities.

Recently, the concept of innovation leadership skills has gotten attention from many scholars and leading development institutions. Tucker (2017), in Forbes magazine, suggested six innovation leadership skills that everyone needs to master: continuously embracing the opportunity mode of thinking; being adept at assaulting assumptions; developing empathy for the end customer; proactively thinking ahead of the curve; continuously fortifying the idea factory; and being adept at building the buy-in.

In Harvard Business Review, Graham-Leviss (2016) suggested five common skills of innovation leaders, derived from a large-scale study on almost 5,000 leaders from a variety of businesses. The survey distinguishes innovative leaders from noninnovative leaders regarding the five skills. Maintaining order and accuracy is the only skill that noninnovative leaders score higher than their counterparts. These five skills include managing risks, expressing curiosity, leading courageously, capturing opportunities, and maintaining a perspective of strategic business.

Gross (2017) similarly suggested five essential skills of innovation leadership skills that can be adopted to stimulate innovation throughout the organization, including managing risks, exploring opportunities, thinking with a strategic standpoint, creating ideas, and prioritizing action.

Jovana (2020) suggested five top skills for innovation leadership—a source of innovation vision, innovative thinking, leading by example, promoting a culture of trust, and recognizing the innovators.

A synthesis of existing literature is conducted to ensure a consensus of the construct in the literature and constructs a preliminary conceptual framework of innovation leadership skills in this study (see Table 4).

Table 4

A Synthesis of Innovation Leadership Skills Components

Tucker (2017)	Graham-Leviss (2016)	Gross (2017)	Jovana (2020)	Current Study
Continuously embracing the opportunity mode of thinking	Seizing opportunities	Identifying opportunities		<i>Opportunity exploration</i>
Continuously fortifying the idea factory		Generating ideas	Innovative thinking	<i>Idea generation</i>
	Managing risk	Managing risk		<i>Managing risk</i>
	Maintaining strategic business perspective	Thinking with a strategic perspective		<i>Strategic thinking</i>
Being adept at assaulting assumptions				<i>Assaulting assumptions</i>
Developing empathy for the end customer				<i>Developing Empathy for Others</i>
Proactively thinking ahead of the curve				<i>Proactive thinking</i>
Being adept at building the buy-in				<i>Idea championing</i>
Demonstrating curiosity			Demonstrating curiosity	
	Leading courageously			<i>Leading courageously</i>
		Putting action first		<i>Idea application</i>
			Source of innovation vision	<i>Realizing innovation vision</i>
			Lead by example	<i>Leading by example</i>
			Promote a culture of trust	<i>Promoting a culture of trust</i>
			Recognize the innovators	<i>Recognizing the innovators</i>

As shown in Table 4, the researcher summarized a series of innovation leadership skills suggested by relevant literature recently. Relying on the summary, the researcher categorized and synthesized the components of innovation leadership skills into 15 components that were used as a preliminary conceptual framework for the current study. Some components were reworded based on relevant literature to make them short and have consistency. The preliminary conceptual framework of innovation leadership skills consists of realizing innovation vision, strategic thinking, managing risk, demonstrating curiosity, developing empathy for others, opportunity exploration, assaulting assumptions, proactive thinking, idea generation, idea championing, idea application, leading courageously, leading by example, promoting a culture of trust, and recognizing the innovators. The following sections review each component in detail.

1) Realizing innovation vision

Jovana (2020) revealed that the innovation leader needs to define what the innovation strategy of the organization is and to provide clear instructions to the members, and ensure they are aligned with it. She emphasized that the ability to convey the innovation strategy and convert it into specific activities for members will increase comprehension and desire to contribute time, money, and ideas to make it happen.

2) Strategic thinking

Because innovation leaders are confined to traditional companies, strategic thinking to the process of innovation is another crucial skill for them (Gross, 2017). They demonstrate this skill by creating and participating in a multifunctional committee; doing a SWOT analysis based on knowledge; rather than embracing the

learning opportunities that naturally arise, aiming to plan activities that widen learning in areas deemed strategic.

3) Managing risks

Managing risk includes outlining at least eight ideas for new projects, referencing best practices for each, and pointing out five possibilities that can be put into effect right away inside the organization; shifting approach from carefully considering everything to starting without having all the answers and making adjustments as necessary; limiting the amount of time you spend thinking about a situation before making a decision (Graham-Leviss, 2016). Gross (2017) believes that the blind spots of a company can be found with the use of a comprehensive risk management auditing process. By properly managing risk, venture capital firms can ensure their funds' profitability and help some of the most creative startups succeed, as he agrees with the risk management expert Steve Culp.

4) Demonstrating curiosity

The innovation leaders demonstrate curiosity by evaluating their current knowledge and skills as well as identifying other knowledge or skills that can help achieve long-term goals; stimulating original thinking by assessing errors and setbacks as chances to learn; scheduling time for learning endeavors, such as attending workshops and classes (Graham-Leviss, 2016).

5) Developing empathy for others

In general, empathy is defined as “the ability to share someone else’s feelings or experiences by imagining what it would be like to be in their situation,” according to Cambridge Advanced Learner’s Dictionary (4th Edition). One obvious example is Jenneifer Rock working in Best Buy's marketing department. She turned the intranet

into a two-way communication tool, which lowered staff turnover. This is because she has a passion for the end customer or user (Tucker, 2017). Tucker suggested some actions for demonstrating empathy: seeking to understand the end user's pain points and listening intensely to what that user needs to achieve, what troubles they confront, and how we might take on their problem.

6) Opportunity exploration

According to Tucker (2017), an innovation leader is passionately attentive to the possibility, to the imagination power, to unmet needs, and to the excitement of making a vision come true; senses potential where other people perceive issues; views the large picture, the development, and the future state of things that have not yet occurred, while others stress over information; has attitude and perspective in determining everything, keep the energy up and move forward. The innovation leaders are adept at taking opportunities by exploring the challenges and issues involved in developing innovative ideas and competitive tactics inside their own firm, considering past opportunities that they declined, asking valued employees to help undertake opportunities (Graham-Leviss, 2016). They are constantly looking for new opportunities to improve current business processes (Gross, 2017). Opportunity exploration involves concentrating on matters that are not related to his regular work and considering ways to make things better (De Jong & Den Hartog, 2008).

7) Assaulting assumptions

According to Tucker (2017), being adept at assaulting assumptions is the ability to get through thinking hurdles that you often have so that one can imagine alternative possibilities. He raised some examples of habitual thinking blocks: "it's always been done that way" or "we already tried that." The innovation leaders always

think that “there’s got to be a better way” in mind and continuously challenge individual, career, and business assumptions (Tucker, 2017).

8) Proactive thinking

Tucker (2017) described proactive thinking as the ability to illuminate the surrounding trends – holding own flashlight in hand. He emphasized that this skill entails predicting the future direction of these patterns. The innovation leaders position themselves to turn the emerging trends into new opportunities by analyzing and understanding developments as they apply to your environment, according to Tucker.

9) Idea generation

Idea generation is the ability of the innovation leader to use her own innovative thinking capabilities and support her members to generate ideas for innovation. An innovation leader needs to connect all the dots, even ones that are not that obvious, as well as to support innovative thinking across the organization by providing different ideation challenges for the members through providing a place for collecting members’ responses and ideas to innovation challenges and changes happening within the organization (Jovana, 2020). This skill involves ideating or inviting consciously generated ideas utilizing mind-mapping tools, according to Tucker (2017). Beyond brainstorming and mind-mapping, idea generation involves encouraging and empowering the employees in the process of creating ideas, guiding recommendations for stimulating innovation from the roots up (Gross, 2017). For example, the freedom to participate in activities more typically related to leadership or entrepreneurs is something innovation leaders give them, according to Gross.

10) Idea championing

As Tucker (2017) claimed, this skill entails selling new ideas by persuasively communicating with other people. According to Tucker, this skill allows innovation leaders to make the innovation aspiration a reality. They strive to persuade people to endorse an innovative idea and get influential organizational members enthused about it (De Jong & Den Hartog, 2008).

11) Idea application

Innovation leaders demonstrate this skill by setting a meeting with their followers or peers to shape the innovation value to the organization, involving in opportunities for networking that attract organizational members, and creating a discussion about innovation regularly (Gross, 2017). They contribute to the execution of new ideas, systematically incorporate creative ideas into work procedures, and work hard to create new things (De Jong & Den Hartog, 2008).

12) Leading courageously

Leading courageously includes considering the alternatives, identifying and confronting risks, and preparing to deal with other people's reactions when facing a tough decision; seeking for an opportunity to express one's thoughts and feelings in a clear and convincing manner, despite whatever opposition one may encounter; being assertive rather than being aggressive (Graham-Leviss, 2016).

13) Leading by example

Innovation leaders must demonstrate their commitment to innovation through a variety of innovation incentives, behaviors, and activities (Jovana, 2020). Sometimes, being role models, leaders demonstrate unconventional behaviors—novel

and surprising to members as well as risk-taking and send messages that these activities are acceptable (Hunter & Cushenbery, 2011).

14) Promoting a culture of trust

Innovation leaders must have confidence in their workers' contributions to innovation and embrace failure as a natural part of the innovation process (Jovana, 2020). According to Jovana, they must encourage everyone in the firm to stick to their ideas and find a way to help them overcome the obstacles they face.

15) Recognizing the innovators

Innovation leaders support and motivate members to participate in innovation activities through a reward system for contributing to innovation (Jovana, 2020).

Based on relevant literature, 15 components of innovation leadership skills mentioned above can be preliminarily conceptualized into three categories, and the categories are renamed, as shown in Table 5.

Table 5

Categories of Innovation Leadership Skills

Innovation Leadership Skills	Description	Category
Realizing innovation vision	the ability to define and convey the innovation strategy to members, as well as build it into reality.	Innovation Vision and Strategy
Strategic thinking	the ability to perform the environmental analysis and seek learning opportunities in areas considered strategic, as well as bring a strategic perspective to the innovation process.	
Managing risk	the ability to identify blind spots that have been missed previously and formulate plans to avert the risk.	
Demonstrating curiosity	the ability to keep knowledge and skills current and actively take the initiative to learn new information, demonstrating engagement and loyalty to goals.	Innovative Thinking
Developing empathy for others	the ability to understand the end user's problems and what they want to accomplish.	
Opportunity exploration	the ability to identify new opportunities and/or a problem needed to be solved.	
Assaulting assumptions	the ability to move beyond habitual thinking blocks and continuously challenge the status quo as well as personal,	

Innovation Leadership Skills	Description	Category
	professional and industry assumptions.	
Proactive thinking	the ability to illuminate the emerging trends and turn them into new opportunities through understanding and analysis of the developments applied to own environment.	
Idea generation	the ability to use own novel thinking capabilities and support members to generate ideas on innovation through a variety of techniques.	
Idea championing	the ability to sell a new idea through personal commitment, persuasive communication, as well as potential alliances.	
Idea application	the ability to bring the new supported idea into practice and make innovation as a regular part of daily operation.	
Leading courageously	the ability to lead with confidence and authority, accept responsibility for making challenging decisions, engage and maintain audience attention in high-stakes meetings and discussions, as well as do not avoid conflicts and differences of opinion.	Innovation Recognition and Support
Leading by example	the ability to act as a role model and unconventionally related to innovation that cause members to engage in such behaviors.	
Promoting a culture of trust	the ability to believe in members and embrace failure on innovation as well as eliminate challenges to innovation creation faced by members.	
Recognizing the innovators	the ability to use a reward system for contributing to innovation.	

To develop innovation leadership skills of the students as listed above, academic management of the school plays a prominent role. Before getting an insight into academic management, an overview of the secondary school context and student leadership development must be notified to understand how student leadership happens and evolves, which may be different from adult leadership in positions. The following section reviews secondary schools and student leadership development.

2.3 Secondary Schools and Student Leadership Development

Before getting an insight into secondary education, general aspects of Cambodian education must be overviewed. As a small nation with a low economic capacity, Cambodian education faces many challenges. Education politics cannot be used in isolation; that is, dual consideration must be given to the political and socio-

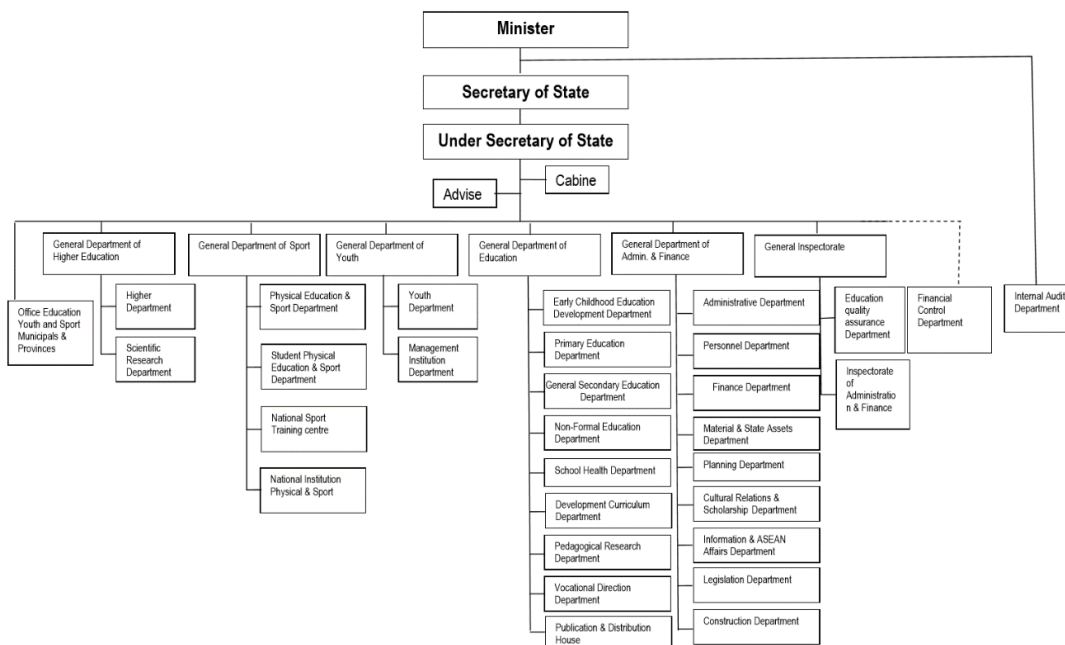
economic contexts of the nation so that the education budget is often the highest in the world based on gross domestic products (GDP) or national expenditure (Sitha, 2016). Low-quality inputs and ineffective management have continued to plague formal education delivery in the country (Sitha, 2016). Current developments in Cambodia's formal education system have been influenced significantly by financial availability, technological competence, and political will (Tandon & Tsuyoshi, 2015; UNESCO, 2000). Quantity (access) concerning low completion rates varying from one school to another and quality regarding low student achievement resulting from low teacher salary and the high student-teacher ratio is still a challenge that the current education system faces (Sitha, 2016). In addition, institutional effectiveness and efficiency struggle because of a centralized system and require capacity-building development (Sitha, 2016). Lacking specific implementation planning at the subnational level and inefficient educational programs result from a top-down basis (Wakabayashi & Kato, 2002).

At present, apart from youth and sport sectors, MoEYS oversees the education sector covering early childhood, primary, secondary, and higher education and both general and vocational education. However, regarding tertiary education, some higher education institutions are under the supervision of other 13 ministries, the office of the Council of Minister, and the National Bank of Cambodia (MoEYS, 2021a). The structure of the MoEYS consists of two levels – central/national and subnational levels. At the central level, there are Inspectorate General, Directorate General, as well as higher education institutions and departments under the MoEYS (see Figure 2), while at the subnational level, there is the Municipal and Provincial Office of Education, Youth and Sport. The vision of the MoEYS is to create and nurture highly

skilled, morally upright human resources so as to create an ethical knowledge-based society in Cambodia and missions are directing, managing, and expanding the education, youth, and sport sectors in Cambodia while addressing the requirements of its people's socioeconomic and cultural growth and the realities of regionalization and globalization (MoEYS, 2019b).

The education system in Cambodia consists of six years of primary, three years of junior secondary, and three years of upper secondary education, or 6-3-3 format. The education system has criticism about its quality. The development is at a very slow pace. Shortage of skillful technical officers in ICT, lack of expertise in curriculum, and planning and management, shortage of some subject teachers, poor teaching methodology, lack of teaching materials and facilities, lack of STEM implementation, and lack of cooperation from enterprises and farms in the private sector are challenges faced by secondary education (MoEYS, 2021a). Figure 2 provides the organizational management structure of MoEYS.

Some scholars argued that pre-university leadership experiences were mostly neglected in leadership study on university students (Cress et al., 2001; Dugan & Komives, 2007). A modest corpus of research on leadership development looks at how it develops over the course of a person's life, including their pre-college years (Komives & Johnson, 2009). This means that secondary school experiences can help develop student leadership and be beneficial when they go to higher education.

Figure 2*Organizational Chart of MoEYS*

Source: MoEYS (2009)

Komives and Johnson (2009) summarized two theories of student leadership development from literature: the social change model of leadership development and relational leadership.

2.3.1 Relational Leadership

Komives, Lucas, and McMahon (1998), in their book entitled “Exploring Leadership: For College Students Who Want to Make a Difference,” provided their leadership model (i.e., relational leadership) to enlighten college students about contemporary leadership approaches. The theoretical paradigm of this leadership has five components: 1) empowering – involving and maximizing the potential and perspectives of each group member; 2) inclusive – open to all perspectives and individuals, looking for investors and stakeholders to collaborate on change; 3) purposeful – being about accomplishing something positive; 4) ethical – respecting

both modal and end values, as well as requiring trust, character, honesty, and truthfulness from members of the group; and 5) process-oriented – paying attention to the group's standardized practices that bring individuals together in communities and distributed leadership duties (as cited in Komives & Johnson, 2009). According to the theoretical paradigm of relational leadership, leadership is "a relational and ethical process of people working together to achieve positive change" (Komives et al., 2007, p. 74). When looking at leadership as a process, both group members and positional leaders can benefit from these aspects of relational leadership, according to Komives and Johnson. Leadership in students can be clearly viewed in the relationship among group members; that is, it is a process they work together in their schools and community for social changes.

2.3.2 Social Change Model of Leadership Development

A nationally recognized group of leadership scholars established the social change model of leadership development according to Higher Education Research Institute (HERI) (HERI, 1996, as cited in Komives & Johnson, 2009). Komives, Wagner & Associates (2009, p. ii) revealed that "leadership is viewed as a purposeful, collaborative, values-based process that leads in constructive societal change" (as cited in Komives & Johnson, 2009). The individual, group, and social components of leadership are philosophically integrated into this comprehensive paradigm. Scholars claimed that the seven values are grouped into three categories to improve the success of social change efforts: self-awareness, consistency, and commitment at the individual level; collaboration, a common goal, and civility in disagreements at the group level, and citizenship at the societal/community (as cited in Komives & Johnson, 2009).

Komives et al. (2005) characterize a six-stage leadership identity development theory as follows:

1) Stage 1 (the awareness): leaders are seen as distant others, especially external adults—the president of the United States or the head of a primary school. The pupil has no idea that he or she is involved in leadership or that he or she is a leader. Adults are perceived as supporters and sponsors, and they begin to include the student in important chores and group activities.

2) Stage 2 (exploration/engagement): to develop friendships, the student becomes interested in joining groups. This stage assists kids in developing relationship skills and exploring their interests, as well as recognizing that organizations serve a purpose and that people have roles to play within them. Through organizations such as neighborhood swim club, church choir, student councils, or scouts, they learn that their older classmates are also leaders, and they desire to participate in groups that are relevant to them.

3) Stage 3 (leader identified): As their interests grow, they realize that organizations are made up of leaders and followers. They understand that organizations are structured in a hierarchical manner. The leader is seen as the one who is leading, while others, as followers, are seen as assisting the leader in completing the task. Many pupils go through a significant transition out of stage three when they realize that groups are made up of people who depend on one another. This may occur when they learn the language of leadership and recognize its complexities when they realize that no single leader can accomplish everything in a group working independently, when they begin to value true teamwork, or when they go through a stage of consciousness shift to understand interdependence (Kegan, 1994, as cited in

Komives et al., 2005). The final three stages of leader identity development are all based on interdependence—a state of being that realizes that achieving goals requires collaboration with others.

4) Stage 4 (leadership differentiated): Students learn to recognize leadership as an activity that occurs among members of a group or organization and as something that may be demonstrated by individuals in non-positional positions (i.e., members in the group acting as leaders). Students realize that they can be “a” leader even though they are not “the” leader at this point. Positional leaders see themselves as facilitators of group work at this stage. Instead of feeling in command of the group, they utilize language like “we” and engage in shared or participative leadership that emphasizes teamwork. Students in this fourth stage also begin to recognize that their groups or organizations are part of a larger system of groups, as well as the links between groups.

5) Stage 5 (generativity): Students engage in the fifth stage of leadership identity development, generativity, in which students join with both passion and commitment to make contributions which will remain beyond their tenure in the organization. They also want to help newer members of the club build their leadership skills. They act as mentors and teachers for the younger or newer members of the group. Personal integrity, based on personal ideals, emerges as vital to their interpersonal connections.

6) Stage 6 (synthesis/integration): The identity of being a leader has become part of the pupils' self-concept. They recognize that they are leading in groups even if they are not in a positional leadership role, and they are confident in their capacity to

deal with the contextual unpredictability of group settings. “I see leadership today as an everyday thing,” one student summarized.

Student leadership development is involved with several stages, starting from being put in-group members or a leader of the group from adults to becoming an identity of leadership or self-concept of being a leader in helping new young members. Everyone in the group can be a leader, not only the leader in position, as they evolve in the middle stage.

Academic management supports students’ innovation leadership skills development, though other types of management may contribute to the development. In the following section, academic management in association with innovation leadership skills development is reviewed.

2.4 Academic Management and Innovation Leadership Skills Development

This section reviews definitions, components, and each component of the academic management that contributes to developing innovation leadership skills. In this section, a preliminary conceptual framework of academic management is constructed through a thorough review of related literature.

2.4.1 Definitions of Academic Management

Academic management is a primary task of an educational institution. It is directly involved with student achievement. For instance, one of the four missions of the higher education institution is to produce quality graduates. It deals with the development of educational quality, which is the ultimate goal of the mission of the educational institution (Pooprasert, 2002). Thus, the role of academic management is to develop quality graduates. Developing quality graduates involves various aspects of academic tasks.

Various definitions of academic management are given by many scholars. Academic management is defined as the administration of all kinds of activities in schools related to the development and enhancement of pedagogical approaches, teaching materials, curricula, as well as teacher development to bring all development outcomes to facilitate and improve teaching and learning to be more effective (Smithason, 1997). It is a process or all operational activities involved in improving teaching and learning, as well as to assess the results for the better in order to fulfill the goals of the curriculum and make the best benefit of the learners (Wahachat, 2007). The management process of all activities related to the improvement of teaching and learning, ranging from policy formulation, planning, improvement, development of teaching and learning, as well as teaching evaluation in order to fulfill the objectives of the curriculum and educational aims for the best benefit of the learners (Wonganutaroj, 2010). To sum up, academic management is a process of all activities in schools involved with policy formulation, planning, development and improvement of curricula, teaching and learning, teaching resources, teaching and learning evaluation, and teacher development for more effective teaching and learning, meeting the curriculum objectives, educational aims, and making the best benefit of the learners. The definitions mentioned above inform some of the areas that academic management covers. The following section reviews the components of academic management.

2.4.2 Components of Academic Management

In this study, to develop the conceptual framework for academic management, the researcher reviewed its components that were identified by academics and researchers.

Academic management includes management of curriculum, instruction, learning assessment, internal supervision, academic personnel development, research and development, other academic projects, academic information systems, and academic performance evaluation of educational institutions (Pooprasert, 2002).

Wahachat (2007) suggested 12 components of academic management in an educational institution as follows:

- 1) Curriculum development
- 2) Learning process development
- 3) Development of learning resources
- 4) Innovative media and educational technology development
- 5) Educational Supervision
- 6) Education guidance
- 7) Research to improve the quality of education
- 8) Measurement and evaluation, and transfer of grades
- 9) Development of quality assurance system within educational institutions
- 10) Promoting academic knowledge to the community
- 11) Coordination for academic development with other educational institutions
- 12) Promotion and technical support for individuals, families, organizations, agencies and other institutions providing education.

Ministry of Education of Thailand (MOE) prescribed 17 components of the academic management, including:

- 1) Developing or operating on giving opinions, developing a local curriculum
- 2) Academic planning
- 3) Teaching and learning in educational institutions

- 4) Development of curriculum of educational institutions
- 5) Learning process development
- 6) Measurement and evaluation and the transfer of grades.
- 7) Research to improve educational quality in educational institutions.
- 8) Developing and promoting learning resources
- 9) Educational Supervision
- 10) Guidance
- 11) Development of the internal quality assurance system and educational standards
- 12) Promoting the community to have academic strength
- 13) Coordination for academic affairs development with other educational entities and organizations
- 14) Promotion and technical support for individuals, families, organizations, agencies, institutions, enterprises, and other educational institutions
- 15) Establishing regulations and guidelines for the academic work of educational institutions.
- 16) Selecting textbooks and lessons for use in educational institutions
- 17) Development and use of technology for education (MOE, 2007, pp. 29-30).

Academic management involves academic planning, curriculum development, instructional management, supervision and teaching and learning development, and academic performance assessment (Asawapoom, 2008). Similarly, academic planning, operating teaching and learning, teaching and learning services, and measurement and evaluation are the components of academic management

(Wonganutaroj, 2010). According to Wonganutaroj, academic planning is involved with academic, operational planning, lesson planning, and learning record; operating teaching and learning includes organizing teaching timetables and classes, preparing teachers and lesson models, and improving teaching and learning; teaching and learning services relate to learning tools, library, and teaching supervision; and measurement and evaluation is a process to be used as a tool in reviewing and analyzing academic results.

In his doctoral dissertation Hang (2017), Minister of Education of Cambodia summarized academic management into three components: curriculum and textbook, the process of teaching and learning, as well as student evaluations and school inspections.

A summary of academic management components in relevant literature is illustrated in Table 6.

Table 6

A Summary of Academic Management Components in the Literature

Author (Year)	Components
Pooprasert (2002)	<ul style="list-style-type: none"> A. Curriculum management B. Instruction management C. Learning assessment management D. Internal supervision E. Academic personnel development F. Research and development G. Other academic projects H. Academic information systems I. Academic performance evaluation of educational institutions
Wahachat (2007)	<ul style="list-style-type: none"> A. Curriculum development B. Learning process development C. Development of learning resources D. Development of innovative media and educational technology E. Educational Supervision F. Education guidance G. Research to improve the quality of education H. Measurement and evaluation and transfer of grades

Author (Year)	Components
	I. Development of quality assurance system within educational institutions J. Promoting academic knowledge to the community K. Coordination for academic development with other educational institutions L. Promotion and technical support for individuals, families, organizations, agencies and other institutions providing education
MOE (2007)	A. Developing or operating on giving opinions, developing a local curriculum B. Academic planning C. Teaching and learning in educational institutions D. Development of curriculum of educational institutions E. Development of the learning process F. Measurement and evaluation and transfer of grades G. Research to improve educational quality in educational institutions. H. Developing and promoting learning resources I. Educational Supervision J. Guidance K. Development of the internal quality assurance system and educational standards L. Promoting the community to have academic strength M. Coordination for academic development with educational institutions and other organizations N. Promotion and technical support for individuals, families, organizations, agencies, institutions, enterprises, and other educational institutions O. Establishing regulations and guidelines for academic work of educational institutions P. Selecting textbooks and lessons for use in educational institutions Q. Development and use of technology for education.
Asawapoom (2008)	A. Academic planning B. Curriculum development C. Instructional management D. Supervision and teaching and learning development E. Academic performance assessment
Wonganutaroj (2010)	A. Academic planning B. Operating teaching and learning C. Teaching and learning services D. Measurement and evaluation
Hang (2017)	A. Curriculum and textbook B. Teaching and learning process C. Student assessment and school inspection

The researcher synthesized and categorized components of academic management into three components, including 1) curriculum development, 2) teaching and learning, and 3) measurement and evaluation as shown in Table 7.

Table 7*Components of Academic Management*

Component	Elements and sources
Curriculum development	<ol style="list-style-type: none"> 1) Curriculum management (Pooprasert, 2002), curriculum development (Asawapoom, 2008; MOE, 2007; Wahachat, 2007); 2) Academic planning (Asawapoom, 2008; MOE, 2007; Wonganutaroj, 2010); 3) Selecting textbooks and lessons for use in educational institutions (Hang, 2017; MOE, 2007)
Teaching and learning	<ol style="list-style-type: none"> 1) Research and development to improve educational quality (MOE, 2007; Pooprasert, 2002; Wahachat, 2007) 2) Academic information systems (Pooprasert, 2002) 3) Development of learning resources (MOE, 2007; Wahachat, 2007) 4) Development of innovative media and educational technology (MOE, 2007; Wahachat, 2007) 5) Education guidance (MOE, 2007; Wahachat, 2007) 6) Development of internal quality assurance system and educational standards within educational institutions (MOE, 2007; Wahachat, 2007) 7) Promoting academic knowledge to the community (MOE, 2007; Wahachat, 2007) 8) Coordination for academic development with other organizations (Wahachat, 2007) 9) Promotion and technical support for individuals, families, organizations, agencies and other institutions providing education (MOE, 2007; Wahachat, 2007) 10) Establishing regulations and guidelines for academic work of educational institutions (MOE, 2007)
Measurement and evaluation	<ol style="list-style-type: none"> 1) Learning assessment management (Hang, 2017; Pooprasert, 2002) 2) Academic performance evaluation of educational institutions (Asawapoom, 2008; Hang, 2017; Pooprasert, 2002) 3) Measurement and evaluation and transfer of grades (MOE, 2007; Wahachat, 2007) 4) Measurement and evaluation (Wonganutaroj, 2010)

The three components of academic management are the crucial factors in developing innovation leadership skills of the students. The following sections review essential elements of each component in developing innovation leadership skills.

1) Curriculum Development

A curriculum is a plan for providing individuals with a series of learning opportunities (Saylor et al., 1981) in the forms of formal education and/or other types

of training intentions (Pratt, 1980). Tyler and Taba popularized this viewpoint, which exemplifies a linear approach to the curriculum (Ornstein & Hunkins, 2018). Ornstein and Hunkins (2018) viewed curriculum as five basic elements: 1) a plan for achieving goals, 2) learning experiences, 3) a study field, 4) subject matters, and 5) grade levels. The curriculum can be viewed as a key element or a process—curriculum development.

Curriculum development is involved with several stages: 1) identifying a philosophy, 2) assessing student ability, 3) considering possible instructional methods, 4) implementing strategies, 5) selecting assessment tools, and 6) being continually adjusted (Wiles & Bondi, 2014).

Taba (1962), one of the popular authors in the curriculum field, described seven major steps of curriculum development, including:

1) Diagnosing learners' needs and societal expectations: identifying the needs of society and/or national development, the local, and students for whom the curriculum is planned.

2) Formulating learning objectives: specifying the objectives of the learning.

3) Selecting learning content: selecting the content that is aligned with the objectives and determining the content's validity.

4) Organizing learning content: arranging the content into a sequence regarding students' maturity, academic achievement, and interests.

5) Selecting learning experiences: selecting instructional methods and/or strategies to help students engage in the content.

6) Organizing learning activities: arranging the learning activities into a sequence in accordance with the content.

7) Determining what to evaluate and the means of evaluation: determining evaluation procedure to ensure that which objectives have been achieved.

In 1949, Ralph Tyler, another influential author of the book entitled “Basic Principles of Curriculum and Instruction”, suggested four steps of the curriculum development, namely 1) formulating objectives, 2) choosing learning experiences, 3) shaping instruction, and 4) evaluating the improvement. In sum, curriculum development comprises formulating learning objectives, selecting, and organizing learning experiences, and evaluating the learning objectives.

As this study aims to develop innovation leadership skills of the students through academic management strategies, which implies the outcome-based technique, in this section, it is necessary to review the outcome-based education and backward design approach of the curriculum development.

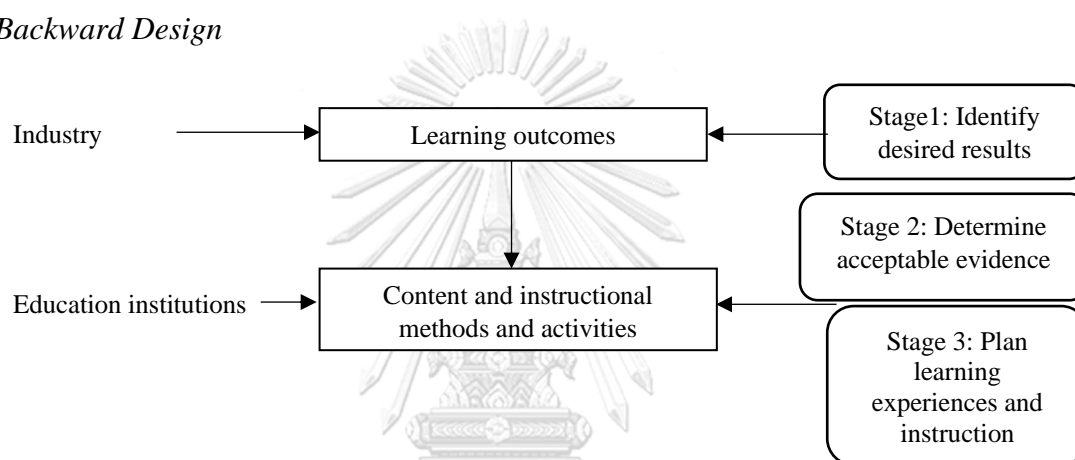
1.1) Outcomes-Based Education and Backward Design

Outcomes-based education is a teaching design in which the learners’ learning outcomes, rather than the subjects to be learned, guide teaching and evaluation (“Outcomes-Based Education,” 2012). Outcomes define what a student must understand or can do after finishing a course or study program, specified by educational goals known as standards and supplemented by learning objectives in light of observable and measurable terms (Shaftel, 2010). In this sense, outcomes can be viewed as knowledge, skills, and/or attitudes (or competency) of the students that the teacher wants to see them demonstrate after completing a course. The outcomes-based education focuses on the mastery of these competencies. Regarding the learning outcomes, specific verbs must be used. Instead of using “understand”, other verbs are suggested, such as describe, define, recall, list, discuss or explain (European Unions,

2011, as cited in Allais, 2014). The outcomes-based model moves from the traditional model – inputs (e.g., content and resources). In curriculum development, the learning outcomes are a starting point, and then the content and methods are selected and organized for meeting the required outcomes (see Figure 3). This approach is called “backward design”, advocated by Wiggins and McTighe (2005).

Figure 3

Backward Design



Source: Researcher’s own illustration. Adapted from (Commonwealth of Learning and SAQA, 2008, as cited in Allais, 2014; Wiggins & McTighe, 2005).

Wiggins and McTighe (2005) suggested three stages of backward design as follows:

1) Identify desired results: in this stage, goals, standards (national, local, school), and curriculum expectations are examined. The goals and expectations must be prioritized due to the limited time.

2) Determine acceptable evidence: teachers and curriculum planners think about a course or unit in light of the gathered assessment evidence required to file and validate that the expected learning has been accomplished, not merely as content to be included or a sequence of learning activities.

3) Plan learning experiences and instruction: teachers and curriculum planners think about instructional activities. Some key questions are addressed in this stage, including what facilitating knowledge (facts, concepts, principles) and what skills (procedures, processes, strategies) will learners need to work effectively and attain required results? What activities will provide students with the required knowledge and skills? What will require to be taught and coached, as well as how should it best be trained regarding performance goals? What resources are best fit to achieve these goals?

Wiggins and McTighe (2005) elaborated a significant difference of backward design from traditional practice:

A major change from common practice occurs as designers must begin to think about assessment before deciding what and how they will teach. Rather than creating assessments near the conclusion of a unit of study (or relying on the tests provided by textbook publishers, which may not completely or appropriately assess our standards and goals), the backward design calls for us to make our goals or standards specific and concrete, in terms of assessment evidence, as we begin to plan a unit or course. (p. 19)

In this study, the learning outcomes or end results are innovation leadership skills. To what extent does curriculum development contribute to developing these skills? Besides the process of curriculum development, curricular (or specific types of curricula) that are considered innovation leadership stimuli are also reviewed.

1.2) Curriculum in Context

Curriculum in context, or contextual teaching and learning (CTL) curriculum, by definition, places content or knowledge demands in the situation of students' and

social needs (Chiarelott, 2006). In this aspect, content is made relevant by its use and relevance in addressing both the learner's individual needs as well as societal issues at the local, national, and global levels. This viewpoint on how content/knowledge, learner, and societal needs are conveyed in the curriculum balances the three sources of curriculum depending on the situation in which learning is to take place.

According to Chiarelott (2006), in a problem-based curriculum, for example, societal needs would most likely be the primary source for determining the program's content, but it would also be vital to analyze how relevant and beneficial such problems are to learners' lives. A project-based curriculum, on the other hand, would place a greater emphasis on determining which of the learners' needs were being addressed through their individually planned projects, but those projects would also need to be placed within the framework of larger social challenges and concerns.

Chiarelott (2006) claimed that only four out of five orientations suggested by Eisner and Vallance are applicable for CTL curriculum designs. They are described as follows:

1) Academic rationalism: This orientation supports essentialism and perennialism in education. It is believed that the curriculum should provide basic learning experiences for students. Thus, it emphasizes content/knowledge rather than learner and society.

2) Cognitive process development: Like academic rationalism, development of cognitive process orientation emphasizes content. However, it is not the content ending in itself; content is a means to an end. This orientation enhances students to think critically and creatively solve problems.

3) Personal relevance: This curriculum orientation emphasizes the learner's needs dominantly over societal or content needs. It posits students at the center, offering opportunities for making choices, and students learn to take responsibility for such choices. This orientation can be seen in projects students select, design, and evaluate. The students simultaneously determine and act within the contexts required to finish the projects. Measurement and evaluation that are suitable for this orientation to curriculum include self-assessment, peer assessment, and teacher evaluation.

4) Societal adaptation and reconstruction: This orientation emphasizes societal needs notably over content and learner. According to social adaptation, curriculum should offer learning opportunities that help pupils succeed in society. Social reconstruction develops learners to be a change agent. This orientation supports problem-based approaches.

1.3 Innovation Hub Curriculum

To develop the next generation of innovation leaders, the innovation-hub curriculum seeks to educate them adept at pressing the frontiers of creativity beyond limits to produce a greater innovation value for a future that is more balanced and sustainable (Bodolica & Spraggon, 2021). Bodolica and Spraggon (2021) revealed that the innovation hub serves as a place for collaboration, communication, and networking among stakeholders such as the educational institution and the industry in a vivacious setting that is favorable for the idea generation, simulation, and visualization of trendy technologies and tools aiming at converting them into actual solutions. The hub also offers a complementary infrastructure and extensive curriculum to stimulate innovation processes by fostering beneficial interactions and encounters between learners, educators, entrepreneurs, and industry executives to

incubate creative ideas, according to Bodolica and Spraggon. They claimed that the core values embedded at the innovation hub include originality, transdisciplinarity, interconnectivity, mobility, and flexibility.

Some recommendations are provided for the innovation hub as follows:

- 1) A hands-on curriculum of learning activities with the purpose of improving creativity of individuals and group.
- 2) A systematic and heterogeneous learning approach that enables teams and their members to learn about innovation processes effectively and pragmatically.
- 3) State-of-the-art personal and group-based methods to improve problem-solving abilities and evaluating ideal solutions.
- 4) A demanding and stimulating working environment for participants to promote innovative and divergent thought.
- 5) Unconventional yet practical approaches to grasping the change nature and market tendencies to generate new ideas.
- 6) Multiple networking and partnership opportunities with industry professionals and scholars to co-create and codevelop feasible resolutions to complicated problems found by various groups of stakeholder (Bodolica & Spraggon, 2021).

Three types of activities are also suggested, including 1) competitions (e.g., project work), 2) events of networking and invitations of guest speaker, and 3) workshops and seminars (Bodolica & Spraggon, 2021). All three activities involve fostering creativity and innovation. The details of these activities are elaborated in the teaching and learning section. Another kind of curriculum that enhances innovation leadership skills is an interdisciplinary curriculum.

1.4) Interdisciplinary Curriculum

Educational institutions have been organized and monitored by professional organizations and accreditors into more specialized silos of knowledge. However, the innovation leaders can think and behave in an integrative and cross-disciplinary way that is suitable, purposeful for a certain setting and users (Banerjee & Ceri, 2016). The term “interdisciplinary curriculum” is used interchangeably with “integrated curriculum” (Cheng & FO-FU, 2002). The interdisciplinary curriculum is a teaching approach that can provide students the subject-matter expertise they need to advance the following fundamental abilities: 1) the proper and thoughtful use of language; 2) thinking through a situation and trying out potential answers; 3) the comprehension and application of science and technology ideas; 4) imagination; 5) observing how individuals engage in groups; and 6) acquiring independent learning skills (Grady, 1994). These basic skills are paralleled with innovation leadership skills as well, such as thinking through a situation and trying out potential answers and imagination.

Grady (1994) described an interdisciplinary curriculum:

Interdisciplinary curriculum presents content across the disciplines by blending teachers' approaches and students' inquiry. Students examine the topic or issue through one of many complex reasoning processes selected by the teachers who have planned the interdisciplinary curriculum. Classes are often held independently of one another with an occasional meeting of all the students and teachers involved in the process. There is considerably more planning to this version and teachers spend time after the initial design planning in meeting to provide continuity to the interdisciplinary process. It is important for teachers to hold an ongoing dialogue

throughout the implementation stage to discuss successes as well as concerns related to the interdisciplinary curriculum in progress. (p. 4)

2) Teaching and learning

Teaching and learning are simply bringing the curriculum into practice—curriculum implementation. To successfully implement the curriculum requires three factors: programs, processes, and people (Ornstein & Hunkins, 2018). As they pointed out, many educational institutions neglect the people factor; rather, spending time and money adjusting the program or process. People factor involves getting people to change their habitual views or thinking, according to Ornstein and Hunkins. Regarding the people factor, teachers are a key to teaching and learning. They must improve their thinking accordingly as the world is rapidly changing, especially for public school teachers; they should move from their complacent zone. The public-school teachers are static; change is a hard task for them to implement. For example, in Cambodia, the state schoolteachers normally do their routine work in the form of traditional teaching (e.g., lecturing), and they are not curious about learning opportunities on new teaching methods, though the training is periodically offered to them. Effective teachers must plan and prepare well, create a supportive learning environment, employ validated instructional strategies, and act professionally (Moore, 2015). So, what is the meaning of teaching and learning?

Teaching is both an art and a science, as Moore (2015) pointed out, though there is controversy among educators. Teaching as art is believed that good teaching is the outcome of combining individual educational background and experience in the classroom—a creative act; teaching as science is believed that good teaching is the outcome of having an intimate knowledge of the subject matter and a thorough

understanding of the teaching and learning principles, according to Moore. A broad definition of teaching, as Moore (2007) defined, is “the actions of someone who is trying to assist others in reaching their fullest potential in all aspects of development” (p. 5) (as cited in Moore, 2015); or “the system for putting the plan into action” (Macdonald, 1965, as cited in Posner, 1972, p. 6). More specifically, teaching and learning can be broadly viewed as developing a learning plan and organizing the learning process in accordance with learners' aptitudes and interests, as well as developing skills corresponding to desirable characteristics, including setting up an atmosphere, environment, and learning resources to facilitate the organization of the learning process, bringing local wisdom or parent network and community to participate in the teaching and learning as appropriate (Khotbanthao, 2008). Teaching and learning are involved with preparing teachers for teaching and timetable; developing teaching plans; and developing learning activities (Wonganutaroj, 2010). In brief, teaching and learning consist of planning the instruction, adopting the instructional strategies and/or methods including various learning models and/or pedagogies, and creating a supportive and positive learning environment.

As the learning outcomes are innovation leadership skills, this study reviews instructional strategies and methods, as well as learning activities that can enhance innovation leadership skills. Literature highlights some types of learning that can develop future innovation leaders. In the book entitled “Creating Innovation Leaders: A Global Perspective,” Bertola et al. (2016) and literature suggested various pedagogies for educating innovation leaders. These include problem-based learning, project-based learning, collaborative learning/cooperative learning, learning in the field or hands-on learning or experiential learning, as well as service-learning. As the

curriculum section reviews CTL curriculum or curriculum in context, teaching and learning in context or CTL will be reviewed in the next section.

2.1) Teaching and Learning in Context or CTL

CTL is defined as a teaching and learning approach that encourages learners to develop relationships between knowledge and its implementation in their lives as members of the family, citizens, and personnel by assisting teachers in connecting subject matter to real-world settings. CTL advocates problem-based learning and other problem-based models, such as project-based learning, case study approaches, and cooperative/collaborative learning, as well as service learning (Chiarelott, 2006). The following sections review each learning models that are considered enhancing innovation leadership skills of the students.

2.2) Problem-based learning

Problem-based learning (PBL) is defined as an instructional approach intended to prepare students for real-world environments (Jonassen & Hung, 2012). By encouraging students to tackle problems, PBL improves students' learning outcomes by supporting their knowledge-applying skills, problem-solving, higher-level thinking, and self-directed learning, according to Jonassen and Hung.

Barrows (1996) identified four elements of problem-based learning, including problem-driven, contextualized, student-centered or self-directed, and cooperative learning practices. First, in problem-based learning, the students' learning is originated by a need to answer an authentic problem (Jonassen & Hung, 2012). Instructors create problems that are representative of authentic, real-world situations or issues that students will face in the workplace after graduation; the problem involves cross-disciplinary collaboration, so students must draw on prior

experience to synthesize and incorporate new information. (Pepper, 2015). Second, through the problem-solving process, as Jonassen and Hung pointed out, students not only gain domain knowledge but also establish relevant knowledge schematics and contextualize the knowledge they have acquired. Third, self-directed learning is a vital component of problem-based learning, according to Jonassen and Hung. Savery and Duffy (1995) argued that in problem-based learning settings, the students must build their own learning skills and techniques to effectively execute the learning tasks. Jonassen and Hung (2012) claimed that students exercise and improve their own problem-solving, self-directed learning, and metacognitive skills by observing and imitating the instructor's reasoning and problem-solving techniques and being able to solve the problem on their own (with adequate direction from the instructor). Finally, in problem-based learning, students work in small groups and working collaboratively, students identify what the "problem" is and collectively create learning issues or objectives for their self-directed learning, as Jonassen and Hung elaborated. They added that the obligation to work in groups allows students to improve their teamwork, collaboration, social and communication skills. As a consequence, over the stages of the PBL process, students participate in the required cognitive processes that assist them actively and self-directly create, apply, incorporate and focus on the intended content information in a particular context (Jonassen & Hung, 2012).

Scholars and researchers believe that the creative problem-solving model allows an individual to develop as a creative leader for innovation, such as Scott et al. (2004), Puccio et al. (2010), and Williams and Foti (2011). Puccio and his colleagues

identified eight principles for developing divergent and convergent thinking abilities are essential to the creative problem-solving model as follows:

1) Divergent thinking: the principles include deferring judgment, aiming for quantity, forming connections, and embracing novelty are some of the guiding ideas that is matched with fluency, flexibility, elaboration, and originality, respectively. These are the four skills of divergent thinking. Deferring judgment helps an individual avoid hampering thinking diversely and generate many diverse and novel ideas when one does not think judgmentally. Going for quantity is much like the idea generation stage, meaning that one breakthrough idea will be accepted, and others can be an opportunity to be learned. Making connections allows an individual to create relationships that extend or intricate on his own ideas or ideas of someone else. Seeking novelty involves introducing originality; that is, thinking outside the box.

2) Convergent thinking: the four principles consist of applying affirmative judgment, keeping novelty alive, checking objectives, and staying focused applied to each skill of the convergent thinking, including screening, sorting, prioritizing, supporting, and developing, respectively. Instead of looking for faults, affirmative judgment entails using good critical thinking. To put it another way, by using affirmative judgment, one should evaluate alternatives from various perspectives to identify and think about both negative and positive viewpoints, instead of focusing solely on the negative aspects of an alternative in order to rule it out. When putting the notion of maintaining novelty into practice, it is critical to not only resist dismissing new concepts too easily but also to foster an open mind about unpredictable outcomes. The principle of examining the goals helps decision-makers to retain the performance criteria in mind when they choose the best option. Staying focused

entails devoting the requisite view and energy to selecting and developing the best option rather than the most advantageous option.

2.3) Project-based learning

Project-based learning is a systematic teaching technique that involves students in an investigation around real-life questions and multidisciplinary in nature (Lam, 2012). Students seek problem solutions by asking and filtering questions, discussing theories, making forecasts, preparing investigations, gathering and analyzing data, drawing conclusions, communicating their results to others, and producing objects such as papers, models, computer programs, and video productions (Blumenfeld et al., 1991). Lam (2012) identified three major components of project-based learning: (1) a guiding question that is based on a real-world problem and whose substance is important to students; (2) opportunities for pupils to conduct an study in order to acquire concepts, utilize content, and build artifacts that demonstrate their understanding of the guiding question; and (3) students work together to share their knowledge in the learning community. According to Lam, project-based learning and problem-based learning are much similar. Both involve students in investigation and have a theoretical context that is similar. Students have more say over the project they will focus on and what they will do in it in project-based learning, though. The course teacher typically specifies a particular problem in problem-based learning.

Barron et al. (1998) proposed that project-based learning must be applied by four principles: 1) making relations between activities and the underlying conceptual knowledge that one hopes to foster by carefully crafting the driving question; 2) providing scaffolding to students prior to project completion; 3)

multiple occasions for formative self-assessment are included, and 4) creating social systems that encourage participation and self-determination. As project-based learning is operated in group work, the group process is key to success. According to Cheng et al. (2008), project-based learning increased students' learning effectiveness only when the group processes included the four elements of positive interdependence, individual responsibility, equal contribution, and social abilities.

The innovative program survey from different universities focusing on developing innovation leaders shows domination of project-based elements (60%) over theoretical matters (40%) (Bertola et al., 2016). They analyzed the various outcomes needed by project-based exercises consisting of the problem formulation, ideas generation, execution and application, and promotion and exploitation. Problem setting and idea generation are the initial steps of the design process at the heart of the new kind of programs, according to Bertola and colleagues.

Their analysis of the surveyed courses identified three categories. First, typical disciplinary programs that also provide foundational and simple subjects, like geometry or computer programming, only account for a small percentage of all courses. Also, within these definitions, however, new teaching methodologies are consistently emphasized. Conventional areas of disciplinary expertise, pedagogical methods intended at improving the learning experience through project-based and on-the-field learning, collaboration, communication skills, and project management skills are often included in these courses. Second, most activities taught fall into the second group of courses that concentrates on modern multidisciplinary topics delivering important contemporary problems, including service and system design, sustainability, future investigations, user-centered and human-computer

interaction (HCI). They are taught primarily by project-based practices and creative techniques, and they have multidisciplinary faculty capable of addressing diverse and cross-disciplinary issues. A final, and far from insignificant, course category reflects the continuing change from problem-oriented to process-oriented learning.

In other words, courses are increasingly focusing on improving students' ability to implement novel cognitive processes when confronted with some form of challenge, rather than on topics. This is the case in many classes centered on making decision, managing innovation, creating social innovation, design thinking, and innovative thinking, for example.

The survey on educational activities as a whole reveals that academic institutions are becoming more committed to changing their pedagogical approach on three levels:

- 1) Using innovative project-based practices of modern didactical methodologies to teach traditional disciplinary courses.
- 2) Addressing emerging and nuanced contemporary problems, moving from disciplinary-focused to problem-focused courses or projects.
- 3) Changing the entire pedagogical target to prepare students to be innovation leaders by concentrating on cognitive processes rather than topics/problems (Bertola et al., 2016).

2.4) Collaborative Learning or Cooperative Learning

Collaborative learning is a process in which students work in pairs or small groups with a maximum of six individuals with the goal of soliciting and respecting each other's abilities and contributions (Udvari-Solner, 2012). Other similar types of learning include peer teaching, team learning, reciprocal learning, study

groups/circles, and cooperative learning, according to Udvari-Solner. Udvari-Solner identified three formats of collaborative learning: study teams and formal and informal learning groups. Formal learning groups are formed to complete a specific assignment or activity in a particular class period or across the course of several weeks in a lesson or semester of study.

Informal learning groups are loosely organized groups of students that form spontaneously during a class session, used to check for comprehending, solving an issue, answering a query, comparing ideas, or taking notes. Study teams are created with the intent of providing reciprocal help in the completion of course or class assignments, which membership is consistent and retained throughout the duration of the course. Members of study teams should meet periodically outside of class to research together and help or guidance to one another, although this is not always possible in secondary and higher education environments.

Johnson and Johnson (1999) suggested five fundamental elements for effective collaborative learning: (1) supportive interdependence, (2) face-to-face promoting interactions, (3) individual accountability, (4) social skills, and (5) group processing (as cited in Zheng, 2017).

2.5) Hands-On Learning/Experiential Learning

Both hands-on learning and experiential learning have much in common. They focus on bringing concepts into application. In other words, learning is to be modified by experiences. However, the literature suggests hands-on learning as laboratory learning (Gautam et al., 2020; Ka Yuk Chan, 2012). Kolb (1984) defined experiential learning as “the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping

and transforming experience” (p. 41). Keeton and Tate (1978) emphasized that experiential learning is directly from life experience and contrasted to formal or content-based learning—traditional classroom learning (as cited in Kolb, 2015). As Kolb pointed out, capturing experience is the action of gathering data, whereas transforming experience is the action of interpreting and working on that data. According to Kolb, grasping and transforming experience involve four learning modes of the learning cycle: concrete experience (CE), abstract conceptualization (AC), reflective observation (RO), and active experimentation (AE). The first two are grasping experience, while the others are transforming experience. For CE, learners must engage themselves openly, fully, and with no bias in novel experiences. Regarding RO, students must reflect on and monitor their experiences from various viewpoints. They must develop ideas that incorporate their findings into theories that make sense logically (AC) and use these concepts to decision-making and problem-solving (AE). These four learning modes are paralleled with experiencing (CE), reflecting (RO), thinking (AC), and acting (AE) (Kolb, 2015). Kolb (2015) described the four learning modes in detail as follows:

- 1) A perspective toward concrete experience places a strong emphasis on participating in experiences and interacting personally with urgent human circumstances. It stresses emotion over thought, a focus on the intricacy and uniqueness of the present moment over theories and generalizations, and an intuitive, "artistic" approach to solving issues over a methodical, "scientific" one. Individuals with a concrete-experience perspective like interacting with people and are adept at it. They frequently make wise decisions intuitively and work effectively in unstructured

environments. This orientation promotes interpersonal relationships, participation in actual events, and an open-minded outlook on life.

2) The goal of a reflective observation orientation is to comprehend the significance of concepts and circumstances via attentive observation and objective description. In contrast to practical application, it places more focus on understanding; it is more concerned with what is true or how things happen than with what would work; and it encourages thought rather than action. People who are contemplative in nature love deducing the meanings of events and concepts and are adept at doing so. They are skilled in appreciating many points of view and viewing things from various angles. They enjoy basing their ideas on their own thoughts and emotions. This viewpoint values perseverance, objectivity, and well-studied, intelligent judgment.

3) Utilizing logic, concepts, and ideas is the main focus of an orientation toward abstract conceptualization. It places more emphasis on thinking than on feeling, on developing broad ideas than on instinctively grasping particular, niche concepts, and on a scientific rather than an aesthetic approach to solving issues. The manipulation of abstract symbols, methodical planning, and quantitative analysis are all skills that someone with an abstract-conceptual orientation loves and excels at. This type of person values accuracy, the rigor and discipline of idea analysis, and the aesthetic appeal of a tidy conceptual framework.

4) An emphasis on active experimentation centers on actively influencing individuals and altering circumstances. It places more focus on practical applications than on introspective knowledge; it is more concerned with what works than with what is unquestionably true; and it places more emphasis on doing than on watching. People who are motivated by and skilled at accomplishing goals have an active-

experimentation mindset. They are prepared to accept some danger in order to accomplish their goals. Furthermore, they like having an impact on their surroundings and want to see outcomes.

Problem-based learning/problem-solving learning, project-based learning, and collaborative learning/cooperative learning forementioned are part of experiential learning.

An example of the task in these kinds of learning can be described from an international entrepreneurial class (Curtis et al., 2020) as follows. The students were tasked with studying the suitable market or sector, rivals, and possible provinces or nations into which the business should expand, and afterward analyzing and evaluating the data to determine which were, in their view, the best two nations to insert: one within the European Union (EU) and one outside EU. They had to choose a market penetration method and a marketing strategy for those nations as well. As a result, the students were required to choose, explain, and use relevant frameworks for international entrepreneurship in a real-world setting, as well as focus on their own learning (i.e., authorize the outcomes of learning). They also had the choice of working on one of the projects. They were also given the option of working alone, in pairs, or in groups. The creative assessment that is appropriate for this learning model is authentic assessment, which will discuss in the measurement and evaluation section.

2.6) Service-learning

Service-learning can be a part of experiential learning and connect to problem-based and project-based learning as well. It is learning while learning.

Bringle and Hatcher (1995) offered a definition of service-learning and perhaps the most cited operational definition:

Service-learning is a course-based, credit-bearing educational experience in which students participate in an organized service activity that meets identified community needs and reflects on the service activity in such a way as to gain further understanding of course content, a broader appreciation of the discipline, and an enhanced sense of civic responsibility. (p. 112)

The definition provided by Bringle and Hatcher (1995) implied that service-learning is not a co-curricular or extracurricular service. They elucidated that there is no documentation and formal evaluation of academic learning. Generally, the different pedagogies that integrate community service and academic study so that each strengthens the other are known as service-learning (Ehrlich, 1996, as cited in Felten & Clayton, 2011). Service-learning is a instructional method that offers structured opportunities for acquiring knowledge and skills by involving youths or learners of all ages in exercises and activities intended to satisfy needs of a community (Billig, 2020). Most scholars agree that service-learning is a teaching and learning process, though it is perhaps offered as a co-curricular or extracurricular activity, according to Billig. Service-learning intends to develop academic knowledge, skills or dispositions, civic education and individual growth, including intercultural competence, critical thinking, and teamwork. In the current study, service-learning is a teaching and learning approach that is designed for youths and students' personal, academic, and social development in meeting a community need and social change.

Billig (2020) distinguished service-learning from other types of community service, volunteerism, internships, and experiential learning in terms of assessing focus and expected benefits. While community service and volunteerism both emphasize the service being delivered—charitable benefits to the service receivers, and both internships and experiential education concentrate on the learning, service-learning balances the two types of activities; it signifies the equal relationship between learning and service, according to Billig. She claimed that service-learning provides benefits to both the service providers and the receivers of the service. The service provider gains from personal growth, including social and emotional, community, or academic in character; the receiver gains from getting their needs satisfied.

Astin et al (2000) examined the impacts of service-learning that include academic performing, self-efficacy, values, career plans, leadership, and the intent to serve after graduation (as cited in Felten & Clayton, 2011). Similarly, Brandenberger summarized personal growth outcomes as spiritual development, moral development, self-authorship, sense of efficacy, identity formation, agency, career development, well-being, and leadership (as cited in Felten & Clayton, 2011). In this sense, service-learning promotes the leadership of the students. In a rapidly changing world, not only do students need general leadership skills they also acquire innovation leadership skills. It infers that service-learning is another teaching and learning approach to develop innovation leadership skills of the students.

In literature, service-learning is widely adopted both in K-12 school and higher education contexts. In K-12, it frequently includes inquiry and preparation,

presentation, and celebration, and it is typically very planned and executed by student groups or a whole class/grade level (Billig, 2020). To run the activity, the group of students may need some funds.

Service-learning can be funded by various sources. They include a government, foundations, faith-based organizations, or higher education institutions or schools (Billig, 2020), sometimes industry practitioners.

Conceptualizing service-learning is one part of the challenges; its implementation is also a challenge for practitioners. Components of service-learning include planning, action, reflection, and demonstration of the results (Billig, 2020). Billig described the practice of service-learning at the school level as follows:

1) Planning: It frequently involves a group activity wherein groups of students, teachers, or community partners brainstorm on identifying a community need and how to meet it, as well as an investigation to ensure that the plans are viable regarding the participants' competences and the timeframe and some sorts of training or dialogue to prepare the participants for the action to be taken. Action means that individuals and groups are involved in offering intended service for the anticipated amount of time.

2) Reflection: It frequently occurs prior to, during, and following the provision of services. Prereflection frequently includes a discussion or a study of societal issues and mutually respectful relationship between service providers and recipients, as well as other themes related to the project objectives, such as visioning, creating objectives, developing empathy, and having diversity respect, or courses on cultural responsiveness, and making sure that the plan is clear. Reflection during the project is often involved with reviewing activities, exchanging

experiences, and considering what occurred and what it implies from different viewpoints. Reflection following the project perfectly relates the project back to the curriculum goals, assists participants in understanding the problem in the environment of how society functions, and sparks a conversation about the importance of social responsibility and a commitment to the community.

3) Demonstration: It serves as an example of how an experience from service-learning activities turned out. Students who demonstrate their learning can better capture the practical and intangible benefits of their service learning. For example, students are able to discuss how they affected the people receiving the services and the changes they saw for themselves. This stage sometimes includes celebration on defined outcomes that can be accepted, and rewards can be given to participants for their efforts.

The National Youth Leadership Council (NYLC) (2008) identified eight standards expanded from the ten principles of Honnet and Pulsen (1990) and recognized as service-learning best practices (Osborne & Renick, 2006). They include 1) a service provision which is evocative to both service providers and service recipients, 2) adequate length and intensity, 3) close link to curriculum, 4) adequate voice and choice of youth and students, 5) reciprocal collaborations between schools and community-based groups, 6) emphasis on equity and diversity issues, 7) in-depth reflection, and 8) progress tracking (as cited in Billig, 2020).

At the course level, Howard (1993) conveyed best practices for service-learning courses as follows:

- 1) Make sure that learning counts toward academic credit rather than service
- 2) Academic rigor must not be compromised

- 3) Establish learning objectives for pupils
- 4) Set criteria for selecting placements for service-learning in the community
- 5) Create sound educational mechanisms for capturing community education (strategies for evaluating what is learned)
- 6) Assist students in acquiring the skills necessary to reap the benefits of community education (help for participating in the essential learning reflection)
- 7) Reduce the difference between community learning role of the students and role of classroom learning
- 8) Reconsider the role of teachers (teachers avoid constant lecturing)
- 9) Be prepared for ambiguity and distinction in learning outcomes of the students
- 10) Augment the community responsibility emphasis of the course (as cited in Osborne & Renick, 2006).

Among these principles, reflection is one of the most important of these (Osborne & Renick, 2006). Bringle and Hatcher (1995) claimed that reflection must be purposeful, pertaining to the experience, and linked to specific learning goals. Additionally, they defined good reflection activities as ones that promote the investigation and clarification of values and link experience to learning. These activities should also be supervised, frequent, allow for feedback, and occur on a regular basis.

Researchers, scholars, and practitioners emphasize “reflection” as an important component of service-learning. Reflection helps students express their opinions and experiences, which is foundational to student leadership rather than positional adult leadership.

3) Measurement and Evaluation

In this section, three terms are involved: measurement, assessment, and evaluation. Measurement simply refers to determining the attributes or dimensions of an object, knowledge, or skill, such as raw scores, percentile ranks, as well as standard scores (STU Online, 2018). Thorndike and Thorndike-Christ (2014) identified three steps for measurement: choosing and describing the attribute, figuring out how to display and separate the attribute, and computing the attribute. The first step refers to what we call “construct,” which is referred to the more difficult-to-observe and abstract properties of people, such as their personality or intelligence. The second step refers to giving an operational definition of the construct. The final step refers to a scale of the construct.

Assessment is a measurement tool that teachers use through gathering information by providing tests, conducting interviews, and/or observing behaviors and has its reliability and validity (STU Online, 2018). Evaluation, in STU Online website, is defined as the process of using the measurements collected in the assessments. Some scholars may view assessment as ongoing and evaluation as complete, while others may see them as equal. The latter views classify assessment and evaluation into formative and summative. The formative assessment or evaluation focuses on an ongoing process that assesses or evaluates for improving the learning, while the summative assessment or evaluation centers on assessing or evaluating for deciding (e.g., pass or fail). Formative assessment/evaluation is the use of data before and/or during a program implementation or instruction for improving student learning (Christ & Kember, 2018; Christ & Kiss, 2018); summative assessment/evaluation is the assessment of the students that happens at

the end of program implementation or a period of instruction for judgment on student accomplishment (Nichols, 2018; Plotner, 2018).

In the measurement and evaluation section, types of assessment that are associated with accurately evaluating innovation leadership skills as well as the learning models as described above are also reviewed. Authentic assessment is the most popular one that is believed to appropriately measure students' performance in real-world problem-solving.

3.1) Authentic Assessment

Grant Wiggins, an educational scholar, who is acknowledged for introducing the concept, describes authentic assessment as concerning those tasks or activities that individuals do in the real world. Authentic assessment is a method of evaluating students that affects them profoundly, is cognitively complex and intrinsically meaningful, uses a format that is consistent with how talent is assessed in the real world and tests skills and abilities that are valuable and meaningful outside of the classroom or on the job (Burrack, 2018).

Thorndike and Thorndike-Christ (2014) described the authentic assessment as tasks that involve students to utilize their knowledge and skills into real-life issues to assess mastery of educational goals in the classroom and on large-scale standardized tests. As Burrack pointed out, one purpose of authentic assessment is to determine the degree to which a student's knowledge and skills can be applied outside of the classroom. Students' ability to analyze a current news article, measure possible savings of a proposed budget, evaluate a theoretical theory, play a musical instrument, converse in a foreign language, or apply other knowledge and skills may be demonstrated by authentic evaluation, according to Burrack.

Teacher educators and researchers suggest an assessment as authentic when it has some of the following characteristics:

1) Assessment context: Realistic context or activity; the performance-based task; the task is cognitively complex.

2) Student's role: A defense of the solution or product is needed; the formative assessment; collaboration among students and between students and the teacher.

3) Scoring: The scoring parameters are either known or created by the students; for scoring, various indicators or portfolios are used; "mastery" is the performance expectation (Frey et al., 2012).

Some examples of authentic assessments consist of role plays and simulations, laboratory experiments, application letters, budget proposals, and other real-life problem-solving tasks (Burrack, 2018).

Authentic assessment is similar to performance assessment. However, not all performance assessments are authentic (Burrack, 2018). According to Burrack, rubrics are frequently adopted to assess the performance quality on activities that are intended to be realistic demonstrations of learning; rubrics can help students achieve higher levels of achievement by including them in the content and process, empowering task facilitation, assisting with knowledge synthesis to guide strategic thinking and problem solving, and turning the task into a learning experience in and of itself. The descriptors in the scoring device describe the decision in scoring student learning in authentic assessment based on reasonable perceptions of method and product relevant to the designated task, claimed by Burrack. He emphasized that aligning learning outcomes to the scoring tool is needed.

An example of authentic assessment from the active, experiential learning approach in the international entrepreneurial class (Curtis et al., 2020) mentioned above is divided into two parts. 50 % of their score is accounted for a 10-minute presentation of live video, a screencast, an computer graphics, or another innovative technique suggested by the learners. The remaining 50% are for a 1,500-word analytical assessment and reflection report on the process the students commenced. This evaluation allows them to reflect on their own view of the evaluation and to identify they had found out problems or were unsuccessful in the process, as well as future lessons they could draw from this. This example shows that authentic assessment either assess the types of learning mentioned above and skills of innovation leaders, such as opportunity exploration, idea generation, idea championing, idea application, or strategic thinking.

Besides, innovation leadership skills can be assessed by self and peer. Student leaders engage in activities, and their peer observe their behaviors. It is fair when students can be assessed by themselves. The next section will review self- and peer assessment in details.

3.2) Self- and Peer Assessment

Self-assessment is an evaluation procedure in which students evaluate their own work and provide feedback (Valle & Andrade, 2015). According to Falchikov and Boud (1989), self-assessment can be used for both formative and summative reasons. Self-assessment adds to the process of learning from a formative perspective by concentrating on students' interest on areas that need development: learners utilize their evaluations to see how well they've completed the task standards or requirements and to find areas where they may improve. Students' self-evaluations can be used by

teachers to grade work as a summative evaluation. Irrespective of the objective of self-assessment, Falchikov and Boud (1989) argue that it (a) is criterion-referenced, implying that it must include (a) openly stated requirements, standards, or expectations, as well as (b) comparisons of one's work to those requirements, standards, or expectations.

Peer assessment is a procedure in which students evaluate the quality of a peer's work or performance, determine how well it matches specific goals or criteria, and provide adjustment ideas (Topping, 2013). According to Lui and Andrade (2015), peer assessment is task-specific; it evaluates the quality of a peer's work rather than a student's abilities or personal traits. Peers might be from the same or other grades, have same or distinguishing ability levels, and be assigned randomly, by the teacher, or by the student.

2.5 Strategy Development

This research study aims to develop academic management strategies of secondary school in Cambodia based on the concept of innovation leadership skills, and the strategies are developed through some techniques, namely needs assessment research and SWOT analysis (i.e., analysis of strengths, weaknesses, opportunities, and threats), as well as TOWS matrix (i.e., a matrix of threats, opportunities, weaknesses, and strengths), this section reviews the needs assessment research and strategic management specifically related SWOT analysis and TOWS matrix.

2.5.1 Needs Assessment

Needs are gaps between current and desired results, or between “What Is” (i.e., where you are now) and “What Should Be” (where you want to be) for results (Altschuld & Watkins, 2014; Kaufman, 2000). According to Kaufman (2000), “a

process of defining those gaps in results and selecting the most important ones for reduction or closure is called needs assessment” (p. 52). As part of the needs assessment process, decisions concerning needs are frequently made, and needs are prioritized to help choose what to do next (Altschuld & Watkins, 2014). Stufflebeam et al. (1985) argued that needs assessments were largely used for two purposes: to enhance planning, to recognize and diagnose issues, and to offer an evaluation of the programs.

Needs assessment can vary at different levels. Kaufman (2000) identified three levels of needs assessment: mega (society), macro (organization), and micro (individual). At the mega level, needs assessment focuses on learning outcomes required by society and the state (e.g., co-innovators or innovation leaders). At the macro level, it emphasizes learning outcomes stated in the national curriculum (e.g., creativity and innovation or collaboration). At the micro-level, it refers to knowledge, skills, as well as attitudes gained from each subject. The needs assessment in the current study is much involved with mega level a somewhat of a macro level. Techniques used in the needs assessment are useful to guide the present study.

Wongwanich (2019) proposed a five-step approach in the needs assessment research that can be taken into account for the current study:

- 1) The study of the desirable state: “What should be”, such as a vision and action plan);

- 2) The study of the present state: ‘What is’ (the current practices);

The gap analysis between the desirable state and current state, or need assessment (i.e., what still has to be done) by setting the priority to identify needs;

3) Evaluation of the causes of the gaps and determination of the causes' priority order (using modified priority needs index-PNI_{modified});

4) The needs assessment will be used to create the study and suggested solutions.

In this research, the first four steps suggested by Wongwanich (2019) are used by calculating PNI_{modified} resulting from the current state and desired state to identify priority needs in order. At the same time, the fifth step refers to the developed strategies. The value of PNI_{modified} can be used for determining strengths, weaknesses, opportunities, and threats, which will discuss in detail in the SWOT analysis section.

1) Modified Priority Needs Index

PNI_{modified} is an indicator of priority needs. The higher value it results, the more priority needs to be improved or solved. It is calculated by a formula (Wongwanich, 2019) as follows:

$$PNI_{\text{modified}} = (I - D)/D$$

Where, I refers to “Importance” or desired state

D refers to “Degree of Success” or existing/current state

In this study, PNI_{modified} is used for determining areas of academic management that should be focused on in developing innovation leadership skills of the students in Cambodia. In other words, what areas of academic management in terms of developing students' innovation leadership skills can be classified as strengths, weaknesses, opportunities, and threats, in combination with the SWOT analysis technique.

2.5.2 Strategic Management

Strategic management is broadly defined as the management of the organization's overall long-term purpose (Witcher, 2020). It makes critical decisions about an organization's future path, including its purpose, resources, and how it communicates with the environment in which it operates (Lynch, 2015). Strategic management is a series of management decisions and actions which assist decide an organization's long-term success (Wheelen et al., 2018b). A consensus definition of the field of strategic management conducted by the study of Nag et al. (2007) is, “the field of strategic management deals with the major intended and emergent initiatives taken by general managers on behalf of owners, involving utilization of resources, to enhance the performance of firms in their external environments” (p. 944).

Recently, scholars have defined strategic management as a focus of competitive advantage. For instance, Rothaermel (2019) defined strategic management as “the integrative management field that combines analysis, formulation, and implementation in the quest for competitive advantage” (p. 6). Similarly, strategic management is the analysis, judgments, and actions taken by a company to create and retain a competitive edge (Dess et al., 2021). Generally, the competitive advantage is about innovation. In brief, strategic management is an organization's integrative management field of analyses, formulation, decisions, and actions for creating competitive advantages in its external environment.

Witcher (2020) claimed that it is important to distinguish between strategic management and strategy, which is an organization's entire method of deciding how to run its business in order to fulfill its long-term goals. The strategy of an

organization must, as Witcher pointed out, be utilized to direct and support the development of sub-strategies in various segments of the company.

1) Strategy

A strategy is a critical tool that helps an organization toward its goals. Siribanpitak (2009) defined a strategy as a method to achieve goals. As Witcher (2020) pointed out, a strategy is an method for guiding operations of the organization to make sure its direction and goals are continued through time. He emphasized that it serves as a reference guide for all managerial decision-making by specifying an organization's overall priorities and defining the critical options for moving activities in the direction of the organization's purpose. Strategy can also be described as a deliberate or emergent path to a goal or vision (Wunder, 2019). A strategy is a comprehensive approach or plan that states how the organization can accomplish its mission and goals (Hunger & Wheelen, 2014; Wheelen et al., 2018a; Wheelen et al., 2018b). The strategy of an organization is a set of goal-oriented actions taken by its management in order to perform better than its rivals and gain a competitive advantage (Gamble et al., 2019; Rothaermel, 2019).

Similarly and more specifically, strategy is about gaining and maintaining a “competitive advantage” over competitors in order to achieve optimum financial performance in a competitive environment while adhering to the main stakeholders' dominant values, which are often investors and top management (Wunder, 2019). According to these definitions, a strategy can be defined as a systematic and deliberate approach telling actions taken by the management of the organization to gain and sustain competitive advantages over competitors in a competitive environment while complaining about the primary stakeholders' dominant values.

Strategy can be classified into prescriptive and emergent strategies (Lynch, 2015). According to Lynch, a prescriptive strategy is one whose objective has been known ahead of time and whose important features have been created prior to the beginning of the strategy; an emergent strategy is one whose ultimate objective is uncertain and whose important features are created during its lifetime, as the strategy is carried out. To develop strategies, it requires several steps.

Strategic management comprises four key elements—environmental scanning, strategy formulation, strategy implementation, and evaluation and control (Hunger & Wheelen, 2014). In this study, strategies are developed through the first two elements— environmental scanning and strategy formulation. Popular approaches to environmental scanning and strategy formulation are SWOT analysis, as well as the TOWS matrix (i.e., matrix of threats, opportunities, weaknesses, and strengths).

2) SWOT Analysis

Long-range planning, strategic planning, and strategy formulation are all terms used to describe the process of developing an organization's mission, objectives, strategies, and policies; Situation analysis is the first step in the process, which involves identifying a strategic alignment between outside opportunities and internal strengths while avoiding outside risks and weaknesses (Hunger & Wheelen, 2014). The SWOT analysis precedes strategy formulation. For external environmental scanning, sociocultural, technological, economic, and political-legal or STEP analysis is used. Some important variables in the external environment are as follows:

- 1) Sociocultural factors: Education level, change in population, change of lifestyles, religions, beliefs, birthrate, life expectancy, gender, family size, minorities etc.

2) Economic factors: education expenditure, economic stability and growth, fiscal policies, monetary policies, government budget, salary policies, interest rate, employment, etc.

3) Technological factors: access to the Internet, technological infrastructure and facilities, technological change and advancement, artificial intelligence (AI), big data, etc.

4) Political-legal factors: government and ministry policies and regulation, education law, political stability, bureaucracy, civil service status, employment law, etc. (Hang, 2017; Hunger & Wheelen, 2014).

3) TOWS matrix

A TOWS matrix is a tool for developing strategy alternatives developed by Wehrich (1982). After the SWOT analysis, variables in strengths, weaknesses, opportunities, and threats are matched in the TOWS matrix (see Table 8).

Table 8

TOWS Matrix

Internal environment	Strengths (S) List 5 to 10 strengths	Weaknesses (W) List 5 to 10 weaknesses
External environment		
Opportunities (O) List 5 to 10 opportunities	SO Strategies (Maximize) Generate strategies here that use strengths to take advantage of opportunities	WO Strategies (Remediate/ Ignore) Generate strategies here that take advantage of opportunities by overcoming weaknesses
Threats (T) List 5 to 10 threats	ST Strategies (Deflect/ Reduce) Generate strategies here that make use of strengths to avert threats	WT Strategies (Minimize) Generate strategies here that diminish weaknesses and avoid threats

Source: Adapted from Hunger and Wheelen (2014), Siribanpitak (2009), and Wehrich (1982).

As shown in Table 8, the following steps are required in generating strategies:

1) In the Opportunities (O) box, list the external opportunities accessible in the organization's present and future environments.

2) In the Threats (T) box, list the external threats the organization faces at the present and future time.

3) In the Strengths (S) box, list the present and future strengths of the organization.

4) In the Weaknesses (W) box, list the present and future weaknesses of the organization.

5) Generate strategy alternatives:

(1) SO strategies (Strengths-Opportunities): "Aggressive strategies" that are created by studying how an organization may possibly choose to make use of its strengths to exploit opportunities.

(2) ST Strategies (Strengths-Threats): "Diversification strategies" that are formulated by thinking an organization's strengths to prevent it from or avoid threats.

(3) WO Strategies (Weaknesses-Opportunities): "Turnaround strategies" that are developed by seizing opportunities by overcoming weaknesses.

(4) WT Strategies (Weaknesses-Threats): "Defensive strategies" that are primarily intended to reduce weaknesses and avert threats (Hunger & Wheelen, 2014).

2.6 Related Research and Studies

This section reviews the previous studies that are considered relevant to the current study. Their key findings and methods are focused.

Gliddon (2006) developed a competency model for innovation leaders from business using the three-round modified Delphi technique that can be classified into

ten categories, including 1) learning; 2) leading groups and teams; 3) energy level and motivation; 4) management and delegation; 5) communication, social skills, and emotional intelligence; 6) dedication and ownership; 7) creativity and imagination; 8) role identity, power, and politics; 9) mission and vision; 10) comprehending the surrounding surroundings. These ten categories consist of expert competencies, core competencies, and supplementary competencies.

Selznick and Mayhew (2018) developed a measurement of innovation capacities of undergraduate students across different fields of study using confirmatory factor analysis. The findings reveal that innovation capacities consisted of three dimensions with nine subscales: intrapersonal (i.e., motivation, being proactive, and self-concept), social (i.e., networking, persuasive communication, and teamwork), and cognitive (i.e., creativity, innovation intent, and taking a risk).

Hang (2017) conducted a study on education management reform strategies for promoting quality citizenship in Cambodia using PNI_{modified}, SWOT analysis/TOWS matrix, as well as a focus group interview. The study sample was 80 schools across 22 provinces and the capital. The respondents consisted of 710, including ten policymakers in education, 30 department directors of MoEYS, 80 school directors, 150 teachers, 80 members of the school support committee, 300 students, and 60 other stakeholders.

The findings show that academic management reform regarding priority needs was secondary to financial management and administrative and general management reforms. Academic management reform strategies for enhancing quality citizenship comprised conducting regular student assessment; improving teaching methods; and integrating quality citizenship into textbooks and school curriculum. Conducting

regular student assessments entails increasing political and government policy and technology support, as well as improving the economy and socio-culture in order to encourage quality national and global citizens, especially by emphasizing knowledge, hard and soft skills, as well as life skills, along with respect for the rule of law.

At the school level, school directors promote and organize the evaluation of school performance against school effectiveness criteria, gather information and data for the student assessment quarterly progress report, and generate and apply it; assemble information and data for the yearly report on the accomplishment of school outcome indicators and objectives, and generate and apply it; incorporate student learning results into the school report card, and allow parents to keep track of their children's progress. Teachers incorporate innovative instructional approaches to increase learning outcomes; establish assessments on learners' knowledge and abilities and civic schooling; offer ongoing, timely assistance to slow learners and create teaching designs and assessment systems; and inspire students to achieve excellence.

At the individual level, students should demonstrate certain abilities: read fluently and clearly in both written and oral form; show an appreciation and application of numeracy, mathematics, and science; think objectively, creatively, and resolve problems independently; take responsibility for civic and staff responsibilities; value others and behave in an honorable and ethical manner; work efficiently both independently and cooperatively.

Sripor (2018) conducted a study of private secondary schools' academic management strategies for developing creative and innovative thinking skills using a multiphase mixed-methods approach with a sample of 223 schools, accounting for 892 respondents. Respondents included school directors, vice school directors of

academic affairs, and teachers. The findings show that the conceptual framework for academic management consisted of curriculum development, teaching and learning, and learning assessment. Teaching and learning had the highest priority needs in comparison to measurement and evaluation and curriculum development, respectively. The strength of academic management was curriculum development; the weaknesses were teaching and learning and measurement and evaluation. Technology was the opportunity for academic management, while politics and policies, economics, and social aspects were the threat.

Wongtienlai (2019) studied academic management strategies of nursing colleges under the jurisdiction of the Ministry of Defense based on the concept of innovator competencies of nursing students through a mixed-methods research design with a study sample of three colleges consisting of 92 respondents (i.e., college administrators and lecturers). The results show that the conceptual framework for innovator competencies consisted of three dimensions and nine subscales: innovative leadership competencies (including managing change, a compelling vision, and engaging in non-work-related interests), innovative thinking competencies (including design thinking and ethical thinking), and entrepreneurship competencies (including ownership, intelligent risk-taker, technological savvy, and building and using networks). Measurement and evaluation were rated as the highest priority needs, followed by learning resource management, research management, curriculum management, respectively, while instructional management was rated as the lowest priority needs. Instructional management, curriculum management, and research management were the strengths, while measurement and evaluation and learning resource management were the weaknesses. Technology was the opportunity for all

five components of academic management, while economic aspects were a threat. Academic management strategies included 1) upgrading the measurement and evaluation management emphasizing entrepreneurship competencies, 2) increasing the efficiency of the learning resource management emphasizing innovative leadership competencies, 3) strengthening research management emphasizing innovative leadership competencies, and 4) increasing the capacity of curriculum management and instructional management emphasizing entrepreneurship competencies.

Chaemchoy (2020) studied secondary school management innovation for creating innovators using a mixed-methods approach in three steps (i.e., confirmatory factor analysis, interviews, and a focus group discussion). Innovator competencies included future focus, social networking, innovative thinking, managing project, content expertise and creation skills, and personal excellence. School management innovation consisted of three innovations: learning management innovation, human resource development innovation, and learning support innovation. Learning management innovation included 1) curriculum development, 2) instruction, 3) measurement and evaluation, 4) media development, innovation and learning resources, and 5) partnership with other organizations.

Curriculum development was focused on competency-based curriculum (integrating different courses and society-based innovation) and customize-based curriculum (self-paced learning and multiple intelligence). Teaching and learning included Science, Technology, Engineering, and Mathematics (STEM) education, design thinking, career education, Technological Pedagogical Content Knowledge (TPACK), social innovators, active learning, and innovator competency-based

instruction. Measurement and evaluation comprised authentic assessment, formative assessment, participative evaluation, and performance-based assessment (innovation project). Media development, innovation, and learning resources included makerspace, the establishment of the internal research unit of innovation, participative learning resource design emphasizing students' interest, and technological-internet learning resource design. Partnership with other organizations was comprised of building a partnership for instruction, internship and training, and business expansion.

Boonkua et al. (2020) studied the priority needs of private primary school management based on the concept of students' innovative leadership through PNI_{modified}. The sample of the study was 340 schools using a multi-stage random sampling, which was accounted for 560 informants, including school directors and teachers. The results reveal that the conceptual framework for innovative leadership included creativity and innovation, continuous learning, teamwork, risk-taker, flexibility and adaptability, problem-solving, grit, positivity, and ethics and responsibility, while the conceptual framework for the academic management consisted of curriculum development, teaching and learning, and measurement and evaluation, as well as student affairs including student efficiency-enhanced activities and extracurricular activities. Measurement and evaluation had the highest priority needs, compared to curriculum development and teaching and learning, respectively. Student efficiency-enhanced activities had higher priority needs than extracurricular activities in the student affairs aspect. Among all components of the academic management (i.e., measurement and evaluation; curriculum development; and teaching and learning) for developing students' innovative leadership, creativity and

innovation were the first in the priority needs, while problem-solving and teamwork were secondary, respectively, in comparison with other six abilities.

Sanitklang (2018) studied secondary school management strategies based on the concept of transcendental leadership through a mixed-methods research design, with a sample of 342 schools. Respondents included school directors, vice school directors of academic affairs, teachers, and student leaders. The results show that teaching and learning, measurement and evaluation, and extracurricular activities were the strengths, while student council activities were the weaknesses.

The social aspect was the opportunity for curriculum development, and teaching and learning and economic aspect was also the opportunity for extracurricular activities. The social aspect was the threat for measurement and evaluation, and the economic aspect was the threat for student council activities. The main strategies were to reform school curriculums (i.e., develop a curriculum and mobilize and harmonize in curriculum development), improve teaching and learning (i.e., quickly develop teaching and learning and strengthen life experience according to aptitude and interest through a variety of learning activities), modify the measurement and evaluation system (i.e., adjust the measurement and evaluation model and provide parents with an opportunity for participation in the measurement and evaluation), upgrade student council activities (i.e., improve student council models and promote student council affairs to be stable as well as build a well-rounded network), and develop the capacity in organizing extracurricular activities (i.e., quickly promote diverse extracurricular activities and develop a model of extracurricular activities).

CHAPTER 3

RESEARCH METHODOLOGY

This study employed a multiphase mixed methods design (Creswell & Plano Clark, 2011). The current study aimed at studying conceptual frameworks of secondary schools' academic management and innovation leadership skills; studying levels of innovation leadership skills of the students; analyzing strengths, weaknesses, opportunities, and threats (SWOT) of secondary schools' academic management; and developing secondary schools' academic management strategies in Cambodia based on the concept of innovation leadership skills.

Responding to each objective of the study, four phases were carried out as follows:

Phase I: Study conceptual frameworks for academic management of secondary schools and innovation leadership skills

Phase II: Study innovation leadership skills levels of the students

Phase III: Analyze SWOT

Phase IV: Develop academic management strategies based on the concept of innovation leadership skills

3.1 Phase I: Studying Conceptual Frameworks

The researcher reviewed and synthesized literature on academic management and innovation leadership skills. The researcher drafted a conceptual framework of academic management and innovation leadership skills for further evaluation from experts.

3.1.1 Participants

Five experts were purposively selected. Creswell and Poth (2018) stated that purposive sampling involves intentionally choosing a group of individuals that can best enlighten the researcher about the current research issue. As suggested by Creswell and Poth, a criterion sample (people who have experienced the phenomenon) ranges from 5 to 25 in the interview. Inclusion criteria for this study include three experts in education management and two experts in innovation leadership skills.

3.1.2 Instrumentation

An evaluation form was used to gather both quantitative and qualitative data regarding the components of academic management and innovation leadership skills. Experts were asked to rate “Agree,” “Not sure,” or “Disagree,” as well as comment on the components. The instrument was scrutinized by the advisor and co-advisor.

3.1.3 Data collection

Prior data collection, the researcher asked for permission letters on data collection from the Faculty of Education, Chulalongkorn University. Data were collected through the online protocol.

3.1.4 Data Analysis

Frequency in descriptive statistics was used for analyzing quantitative data. Qualitative data were analyzed using content analysis. A four-step content analysis were conducted: 1) familiarizing the data, 2) splitting the text into meaning units and then condensing these meaning units, 3) developing codes, and 4) forming categories and themes (Erlingsson & Brysiewicz, 2017).

3.2 Phase II: Studying Innovation Leadership Skills Levels of the Students

After conceptual frameworks were verified in Phase I, the researcher conducted a survey to measure levels of students' innovation leadership skills.

3.2.1 Population and Sample

Study population in this phase totaled secondary school students, accounted for 654,306 students (Lycee 10-12 and Lycee 7-12) according to MoEYS (2021b). According to Yamane (1973), for indefinite population, the sample size is at least 400. A study sample of 2,662 students from 82 schools were chosen to be a part of the study in this phase using multistage, stratified random, simple random, and convenience samplings. First, from one to three provinces were randomly chosen from each region using simple random sampling—nine provinces were selected. Second, schools were conveniently selected from each province. Third, at least 30 students from one class to three classes were conveniently selected according to convenience of the schools. Table 9 provides more detail about the population and sample.

Table 9

Population and Sample in Phase II

Regions	Provinces		Schools		Students
	Population	Sample	Population	Sample	Sample
Central	5	3	163	47	1,728
East	3	1	79	6	240
North	4	1	100	3	14
West	4	1	39	13	276
Northeast	3	1	47	4	144
Southwest	3	1	79	6	126
Northwest	3	1	47	3	134
Total	25	9	554	82	2,662

3.2.2 Instrumentation

A questionnaire instrument was used in this phase. The questionnaire consisted of three sections: demographic information of the respondent, innovation leadership skills of the students, and open-ended questions. Demographic information included gender, age, grade, education strand, and student position. The student innovation leadership skills questionnaire consisted of 15 dimensions with 58 items, including realizing innovation vision (3 items), strategic thinking (4 items), managing risk (3 items), demonstrating curiosity (3 items), developing empathy for others (3 items), opportunity exploration (5 items), assaulting assumptions (3 items), proactive thinking (6 items), idea generation (6 items), idea championing (3 items), idea application (5 items), leading courageously (3 items), leading by example (3 items), promoting culture of trust (4 items), and recognizing the innovators (4 items). Respondents were asked to rate statements with a five-point Likert-type scale (1 = strongly disagree to 5 = strongly agree). The items were revised from the literature (Bateman & Crant, 1993; De Jong & Den Hartog, 2008; Drapeau, 2014; Gliddon, 2006; Graham-Leviss, 2016; Gross, 2017; Horth & Buchner, 2014; Howell & Boies, 2004; Jovana, 2020; Tucker, 2017; West et al., 2003; Zabelina & Condon, 2020) and developed from the researcher. All items were positively worded.

To examine the instrument quality, five content experts were used, and Item Objective Congruence (IOC) index was calculated to examine the content validity. Items with the IOC index above 0.5 are regarded as good and no revision is required. The IOC indices ranged from 0.8 to 1 (see Appendix B). However, four items were slightly revised regrading word use according to the experts' comments. For example, item numbered 1 "I clearly define my new learning strategies" was revised to "I can

clearly define my new learning strategies.” Reliability was calculated for each component (or subscale) using Cronbach’s alpha coefficient (α). Cronbach’s alpha coefficients ranged from .447 to .850. Table 10 illustrates reliability of the student innovation leadership skills questionnaire.

Table 10

Results of the Student Innovation Leadership Skills Questionnaire Reliability

Components of Innovation Leadership Skills	α (n=86)
1. Realizing innovation vision	.551
2. Strategic thinking	.694
3. Managing Risk	.517
4. Demonstrating Curiosity	.447
5. Developing Empathy for Others	.627
6. Opportunity exploration	.661
7. Assaulting assumptions	.515
8. Proactive thinking	.753
9. Idea generation	.665
10. Idea Championing	.784
11. Idea Application	.850
12. Leading courageously	.730
13. Leading by example	.659
14. Promoting culture of trust	.619
15. Recognizing the innovators	.785
Student Innovation Leadership Skills Questionnaire	.959

As shown in Table 10, four components had Cronbach’s alpha coefficients below 0.6 and were thus revised, including word change and new item development (see Appendix C). After revision, the number of items were changed as follows: realizing innovation vision (5 items), strategic thinking (5 items), managing risk (5 items), demonstrating curiosity (7 items), developing empathy for others (3 items), opportunity exploration (5 items), assaulting assumptions (5 items), proactive thinking (6 items), idea generation (6 items), idea championing (3 items), idea application (5 items), leading courageously (3 items), leading by example (3 items), promoting culture of trust (4 items), and recognizing the innovators (4 items).

3.2.3 Data Collection

Data were gathered through both on-site and online protocols. The participants read the questionnaire carefully to understand and decided whether they volunteered to participate in the study. In addition, school management team checked the questionnaires regarding research ethics and permitted students to do. The participation of the respondents in the study were strictly confidential and voluntary. The participants were allowed to read ethical issues specified in the questionnaire. The returned questionnaires were regarded as their participation.

3.2.4 Data Analysis

Quantitative data gathered from the questionnaires were analyzed using descriptive statistics, namely frequency, mean (*M*), and standard deviation (*SD*). Qualitative data from open-ended questions were analyzed using content analysis. The interpretation of mean scores are as follows (Srisaat, 1996):

4.51 – 5.00 interpreted as the highest level

3.51 – 4.50 interpreted as the high level

2.51 – 3.50 interpreted as the moderate level

1.51 – 2.50 interpreted as the low level

1.00 – 1.50 interpreted as the lowest level

3.3 Phase III: Analyzing Strengths, Weaknesses, Opportunities, and Threats

This phase was the main phase of the study that helped the researcher to draft the strategies. This phase aimed to analyze SWOT of academic management of the secondary schools based on the concept of innovation leadership skills through analyzing internal environments (strengths and weaknesses) and external

environments (opportunities and threats). This phase was carried out into the following steps as follows.

3.3.1 Step 1: Study Priority Needs of Academic Management of Secondary Schools Based on the Concept of Innovation Leadership Skills

This step studied current state and desirable state of secondary schools' academic management based on the concept of innovation leadership skills.

1) Population and Sample

The study population was 554 public secondary schools under the MoEYS. At least 83 schools are needed to be a part of the study in this phase, using the Table of Yamane (1973) with an error of 10 percent. A sample of 94 schools were selected using multistage and stratified random sampling, as well as convenience sampling. First, from one to three provinces were randomly selected from each region (seven regions in total) using simple random sampling. Second, stratified random and convenience samplings were used to select sample schools from each province. Respondents include school directors, vice school directors, and teachers. One school director, one vice school director in charge of academic affairs, and seven teachers per school were conveniently selected. Table 11 provides the actual population and sample of the study in this phase.

Table 11

Population and Sample in Phase III

Regions	Provinces		Schools		Respondents	
	Population	Sample	Population	Sample	Sample	
Central	5	3	163	50	292	
East	3	1	79	10	31	
North	4	1	100	5	18	
West	4	1	39	14	51	
Northeast	3	1	47	5	23	
Southwest	3	1	79	7	32	

Regions	Provinces		Schools		Respondents
	Population	Sample	Population	Sample	Sample
Northwest	3	1	47	3	16
Total	25	9	554	94	463

2) Instrumentation

The survey questionnaire was used in this phase. The questionnaire instrument was developed by the researcher. The questionnaire consisted of three sections, including demographic information of the respondents in the first section, academic management based on the concept of innovation leadership skills in the second section, and open-ended questions in the third section. The questionnaire was designed in dual-response format; that is, the second section asked the respondents to rate each statement for current and desirable states on a five-point Likert scale (1 = lowest level of current practice/lowest level of desirable practice to 5 = highest level of current practice/highest level of desirable practice, respectively). For example, regarding the internal environment related to curriculum development, one question asks, “At what level does your school identify learning outcomes in the curriculum to develop students' innovation leadership skills in the following areas (1.1 Realizing innovation vision, 1.2...etc.)?” Regarding the external environment related to curriculum development, one question asks, “At what level do you think political-legal factors such as political stability and state policies and regulations) are conducive to curriculum development of the secondary public schools aimed at developing students' innovation leadership skills in the following areas (1.1 Realizing innovation vision, 1.2...etc.)?”

3) Data Collection

Data were gathered through both on-site and online protocols. The participants read the questionnaire carefully to understand and decided whether they volunteered

to participate in the study. In addition, school management team checked the questionnaires regarding research ethics and permitted students to do. The participation of the respondents in the study were strictly confidential and voluntary. The participants were allowed to read ethical issues specified in the questionnaire. The returned questionnaires were regarded as their participation.

4) Data Analysis

Quantitative data gathered from the questionnaires were analyzed by frequency, mean, standard deviation, and PNI_{modified} . Qualitative data from open-ended questions (if any) were analyzed by content analysis.

PNI_{modified} is calculated by a formula (Wongwanich, 2019) as follows:

$$PNI_{\text{modified}} = (I - D)/D$$

Where, I refers to “Importance” or desired state

D refers to “Degree of Success” or existing/current state

3.3.2 Step 2: Ranking PNI_{modified}

To identify SWOT, values of PNI_{modified} are divided into two groups—high group and low group, through calculating an average value of PNI_{modified} in the group. The average value in the group can be calculated by summing the highest value of PNI_{modified} and the lowest value of PNI_{modified} in the group and then divided by 2.

Any functions of academic management or statements that have a value of PNI_{modified} higher than an average value in the group is considered “Weaknesses (W),” while the lower ones are considered “Strengths (S)” in the internal environment. Similarly, any external factors or statements that have a value of PNI_{modified} higher than an average value in the group are considered “Threats (T),” while the lower ones are considered “Opportunities (O)” in the external environment.

3.4 Phase IV: Developing Strategies, Strategies, and Procedures

To develop strategies, substrategies, and procedures, the following steps were carried out.

3.4.1 Step 1: Drafting Strategies, Substrategies, and Procedures

Based on the results of SWOT analysis in Phase III, the researcher drafted strategies, substrategies, and procedures using the TOWS matrix. Strategies and substrategies were developed based on the three areas of academic management and matching SWOT, respectively, as follows:

- 1) SO (Strength-Opportunity): it is an aggressive strategy that uses strengths to maximize opportunities.
- 2) ST (Strength-Threat): it is a diversification strategy that uses strengths to minimize threats.
- 3) WO (Weaknesses-Opportunities): it is a turnaround strategy that uses opportunities to minimize weaknesses.
- 4) WT (Weaknesses-Threat): it is a defensive strategy that minimizes weaknesses and avoids threats.

Procedures were developed using literature, open-ended questions, and the external environment from the questionnaires. The draft was initially scrutinized by the advisor and co-advisor. After that, the researcher brought first draft of strategies, substrategies, and procedures into the next step.

3.4.2 Step 2: Evaluating Strategies, Substrategies, and Procedures by Individual Experts

The first draft of the strategies, substrategies, and procedures were evaluated and validated by stakeholders in terms of suitability and feasibility, plus other comments, or recommendations.

1) Participants

Nine participants were selected by using purposive sampling. The participants included five academics in educational management, two awarded or new generation school directors, and two experts in innovation leadership (see Appendix A).

2) Instrumentation

An evaluation form was used in this phase. The evaluation form consisted of three sections: the first section asked about demographic information of the respondents in checklist format, including full name, current position, work experience in the current position, and contact; the second section was about suitability and feasibility of strategies, substrategies, and procedures using a five-point Likert scale (1 = least suitable/least feasible to 5 = most suitable/most feasible, respectively) and provided spaces for comments; and the third section was about open-ended questions and additional comments and recommendations.

3) Data Collection

The evaluation form was administered to nine experts individually via the online protocol (i.e., Telegram, Email, and Line).

4) Data Analysis

Quantitative data gathered from the questionnaires were analyzed by frequency, mean, and standard deviation. Qualitative data from comments were analyzed by content analysis.

Based on the comments or recommendations, the researcher revised the first draft of the strategies, substrategies, and procedures and then asked the advisor and co-advisor to check. After that, the second draft were created.

3.4.3 Step 3: Validating Strategies, Substrategies, and Procedures by a Focus Group

The second draft of the strategies, substrategies, and procedures were validated by stakeholders with comments or recommendations through a focus group discussion.

1) Participants

To reach the target of 12 participants, 18 participants were purposively invited. Out of 18 participants, 16 participants took part in the focus group. The participants include three academics in educational management, three school directors, six educational leaders of the MoEYS, and four experts in innovation leadership skills (see Appendix A).

2) Instrumentation

An evaluation form was used in this phase. This evaluation form of the second draft, developed by the researcher and checked by the advisor and co-advisor, consisted of three sections: the first section asked about demographic information of the respondents in checklist format including full name, current position, work experience in the current position, and contact; the second section was about

comments on the second draft of the strategies, substrategies, and procedures; and the third section was about additional comments and recommendations.

3) Data Collection

The researcher requested for invitation letters from Faculty of Education, Chulalongkorn University for participation in the focus group discussion and sent them to the participants. The focus group was conducted via the online protocol (i.e., Zoom), recorded, and transcribed verbatim, with consent from the participants.

4) Data Analysis

Content analysis was used for data analysis in this phase.

Based on the comments or recommendations, the researcher revised the second draft of the strategies, substrategies, and procedures and then asked the advisor and co-advisor for further check. After that, the final draft was completely developed.

The research methodology can be summarized as shown in Table 12.

Table 12

A Summary of Research Methodology

Phases	Procedures	Products
1. Study conceptual frameworks	1. Review and synthesize literature on academic management and innovation leadership skills and draft conceptual frameworks. 2. Interview -Participants: five experts -Instrument: the evaluation form -Data collection: the researcher (online) -Data analysis: frequency, percentage, and content analysis	Conceptual frameworks of academic management and innovation leadership skills
2. Study levels of innovation leadership skills of the students	-Sample: 2,662 students from 82 schools -Instrument: the questionnaire about student innovation leadership skills -Data collection: the researcher (both on-site and online) -Data analysis: mean, standard deviation, frequency, percentage	Innovation leadership skill levels of the students (mean score)
3. Analyze SWOT	1. Step 1: Study priority needs of academic	Strengths, weaknesses,

Phases	Procedures	Products
	<p>management based on innovation leadership skills</p> <ul style="list-style-type: none"> -Sample: 94 schools -Instrument: questionnaire about current and desirable states -Data collection: the researcher (both on-site and online) -Data analysis: mean, standard deviation, frequency, percentage, $PNI_{modified}$, <p>2. Step 2: Ranking $PNI_{modified}$</p> <p>$PNI_{modified}$ ranking (Higher values of $PNI_{modified}$ in the group considered as strengths and opportunities, while the lower as weaknesses and threats)</p>	<p>opportunities, and threats of academic management based on the concept of innovation leadership skills</p>
4. Develop strategies, substrategies, and procedures	<p>1. Step 1: Draft strategies, substrategies, and procedure (first draft)</p> <ul style="list-style-type: none"> -TOWS matrix -Matching SWOT 	<p>Strategies; substrategies, and procedures of academic management based on the concept of innovation leadership skills (first draft)</p>
	<p>2. Step 2: evaluate the first draft of strategies, substrategies, and procedures by individual experts</p> <ul style="list-style-type: none"> -Participants: 9 experts -Instrument: evaluation form with additional comments (individually) -Data collection: the researcher (online) -Data analysis: frequency, mean, standard deviation, and content analysis 	<p>Strategies, substrategies, and procedures of academic management based on the concept of innovation leadership skills (second draft)</p>
	<p>3. Step 3: validate the second draft of strategies, substrategies, and procedures by a focus group</p> <ul style="list-style-type: none"> -Participants: 16 -Instrument: evaluation form in the focus group discussion -Data collection; the researcher (online) -Data analysis: content analysis 	<p>Strategies, substrategies, and procedures of academic management based on the concept of innovation leadership skills (final draft)</p>

CHAPTER 4

RESULTS

The main purpose of this study was to develop academic management strategies of secondary schools in Cambodia based on the concept of innovation leadership skills.

This chapter reports the findings of the study pertaining to the following areas:

1. Conceptual frameworks of academic management of secondary schools and innovation leadership skills
2. Innovation leadership skills levels of the students
3. Strengths, weaknesses, opportunities, and threats (SWOT) analysis
4. Strategies, substrategies, and procedures of academic management based on the concept of innovation leadership skills

4.1 Conceptual Frameworks of Academic Management of Secondary Schools and Innovation Leadership Skills

Based on the review of literature, the conceptual frameworks for academic management and innovation leadership skills were drafted as follows:

1. Academic management
 - 1) Curriculum development
 - 2) Teaching and learning
 - 3) Measurement and evaluation
2. Innovation Leadership Skills
 - 2.1 Innovation Vision and Strategy
 - 1) Realizing innovation vision
 - 2) Strategic thinking

3) Managing risk

2.2 Innovative Thinking

- 1) Developing empathy for others
- 2) Demonstrating curiosity
- 3) Opportunity exploration
- 4) Assaulting assumptions
- 5) Proactive thinking
- 6) Idea generation
- 7) Idea championing
- 8) Idea application

2.3 Innovation Recognition and Support

- 1) Leading courageously
- 2) Leading by example
- 3) Promoting a culture of trust
- 4) Recognizing the innovators

Table 13 provides results of experts' evaluation on the conceptual frameworks for academic management of secondary schools and innovation leadership skills.

Table 13

Results of Experts' Evaluation on the Conceptual Frameworks for Academic Management of Secondary Schools and Innovation Leadership Skills

Variables	Experts' Evaluation (n = 5)				Comments or Suggestions
	Agree	Not Sure	Disagree	Percent	
Academic Management					

Variables	Experts' Evaluation (n = 5)				Comments or Suggestions
	Agree	Not Sure	Disagree	Percent	
1. Curriculum development	4	1		80	
1.1 Identify learning outcomes in the curriculum	4	1		80	
1.2 Use learning outcomes in subject development	4	1		80	
2. Teaching and learning	4	1		80	
2.1 Organize learning activities	4	1		80	Does this include classroom management and teaching methods?
2.2 Develop learning media and resources	4	1		80	2.3 Using student learning outcomes to improve teaching and learning
3. Measurement and evaluation	4	1		80	
3.1 Measure and assess student learning outcomes	4	1		80	
Innovation Leadership Skills					
1. Innovation Vision and Strategy	5			100	1.4 Embracing change: Ability to be prepared to accept changes in line with new trends to better develop oneself.
1.1 Realizing innovation vision	5			100	
1.2 Strategic thinking	5			100	Analyze the environment or analyze the situation?
1.3 Managing risk	5			100	Ability to identify uncertainties that may occur, but we can plan to mitigate those risks.
2. Innovative Thinking	5			100	
2.1 Demonstrating curiosity	5			100	If possible, include "lifelong learning" and "enthusiasm"
2.2 Developing empathy for others	5			100	
2.3 Opportunity exploration	5			100	
2.4 Assaulting assumptions	4	1		80	
2.5 Proactive thinking	5			100	(Trends) Evolution?
	5			100	1. Encourage support 2. Should be the ability to cultivate innovation or Nurture Creativity rather than the use of thinking ability.
2.6 Idea generation					
2.7 Idea championing	5			100	Dissemination of new ideas
2.8 Idea application	5			100	
3. Innovation Recognition and Support	5			100	
3.1 Leading courageously	5			100	
3.2 Leading by example	5			100	Participate in adopting this behavior?

Variables	Experts' Evaluation (n = 5)			Comments or Suggestions
	Agree	Not Sure	Disagree	
3.3 Promoting a culture of trust	5			100 Trust?
3.4 Recognizing the innovators	5			100 Give reward?

Table 13 shows that most experts agreed with the components of academic management and innovation leadership skills. For the components of academic management, four out of five experts agreed with all proposed components, accounted for 80 percent. For the components of innovation leadership skills, all experts agreed with all proposed components, except for “Assaulting Assumptions” with agreement of four experts and being not sure from one expert.

Regrading comments and suggestions, most comments involved wordy issues or translation. So, the researcher revised the definitions of each component according to the experts' comments. For example, for “Strategic Thinking” component the researcher revised from “Analyze environments” to “Analyze environments and situations.” There were two suggestions for adding new components. They were “Using student learning outcomes to improve teaching and learning” in teaching and learning and “Embracing change: Ability to be prepared to accept changes in line with new trends to better develop oneself” in the innovation vision and strategy. The researcher decided not to add these two components for some reasons. Regarding the new component in teaching and learning, it is about measurement and evaluation. Teachers assess learning outcomes and use the results for improvement. Concerning the new component in innovation vision and strategy, its meaning is the same as the

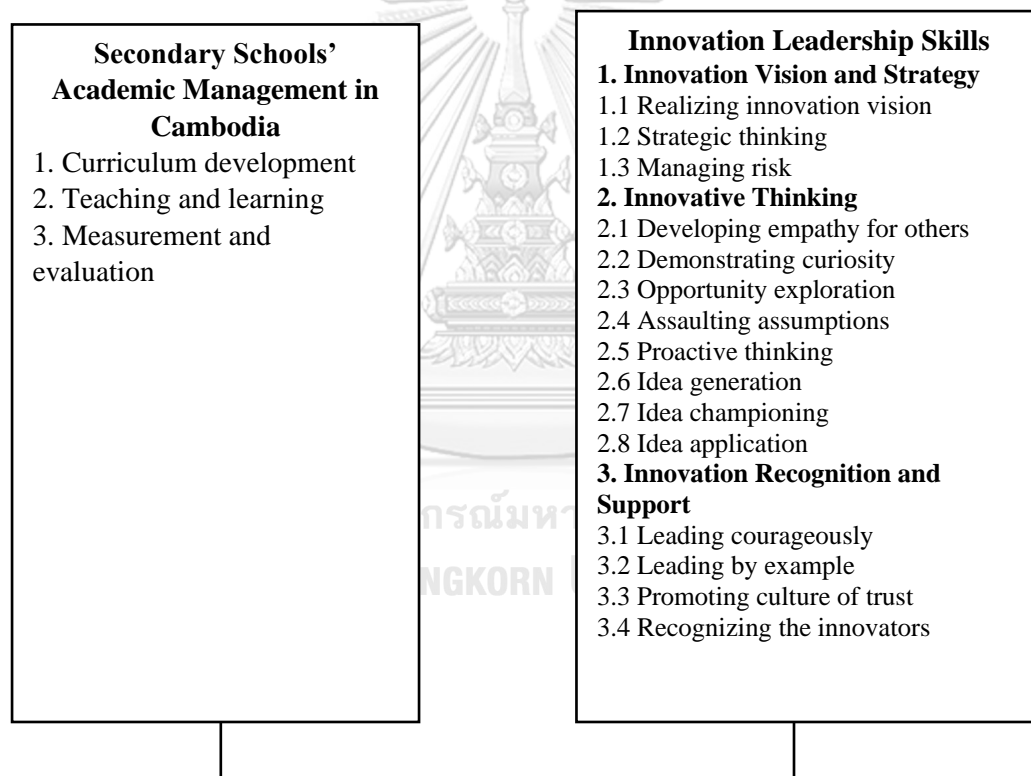
component of assaulting assumptions, which means challenging the status quo. In other words, it means embracing change.

4.1.1 Final Conceptual Frameworks for Academic Management and Innovation Leadership Skills

After experts' evaluations, the final conceptual frameworks for academic management and innovation leadership skills are illustrated in Figure 4.

Figure 4

Conceptual Frameworks for Academic Management and Innovation Leadership Skills



4.2 Innovation Leadership Skills Levels of the Students

In this section, gathered data from the questionnaires via both online and on-site protocols are presented in terms of frequency, percentage, mean, and standard deviation.

Table 14*Demographic Information of the Student Sample (n = 2,662)*

Variable	Frequency		Total (%)
	Female (%)	Male (%)	
Province (Region)			
Phnom Penh (Central)	700 (53.64)	605 (46.36)	1,305 (49.02)
Kandal (Central)	198 (59.10)	137 (40.90)	335 (12.58)
Kampong Cham (Central)	71 (80.68)	17 (19.32)	88 (3.31)
Svay Rieng (East)	146 (60.83)	94 (39.17)	240 (9.02)
Banteay Meanchey (North)	11 (78.57)	3 (21.43)	14 (0.53)
Krachah (Northeast)	92 (63.89)	52 (36.11)	144 (5.41)
Battambang (Northwest)	89 (66.42)	45 (33.58)	134 (5.03)
Takeo (Southwest)	75 (59.52)	51 (40.48)	126 (4.73)
Kampong Speu (West)	158 (57.25)	118 (42.75)	276 (10.37)
Gender			
Female			1,122 (42.15)
Male			1,540 (57.85)
Age			
Less than 16	337 (21.88)	218 (19.43)	555 (20.85)
16-18	1,117 (72.53)	818 (72.91)	1,935 (72.69)
Greater than 18	86 (5.58)	86 (7.66)	172 (6.46)
Grade			
Grade 7	65 (57.52)	48 (42.48)	113 (4.24)
Grade 8	101 (59.76)	68 (40.24)	169 (6.35)
Grade 9	89 (52.05)	82 (47.95)	171 (6.42)
Grade 10	289 (58.74)	203 (41.26)	492 (18.48)
Grade 11	334 (58.91)	233 (41.09)	567 (21.30)
Grade 12	662 (57.57)	488 (42.43)	1,150 (43.20)
Education Strand			
Science	598 (58.92)	417 (41.08)	1,015 (38.13)
Social Science	481 (56.79)	366 (43.21)	847 (31.82)
Others (Grade 7-10)	461 (57.62)	339 (42.38)	746 (30.05)
Student Position			
Ordinary Student	1,337 (58.92)	965 (41.92)	2,302 (86.48)
Class Monitor	112 (55.45)	90 (44.55)	202 (7.59)
Student Council Leader	57 (53.27)	50 (46.73)	107 (4.02)
Others (Vice class monitor)	34 (66.67)	17 (33.33)	51 (1.92)

Note. Responses included on-site 1,612 (60.6%) and online 1,050 (39.4%). Number of schools = 82

(including two new generation schools).

Table 14 indicates that the collected data represented the balance in the data regarding regions, gender, and online or on-site. Central region represented more than

a half (65%) compared to the rest. About a half of the sample (58%) were male. Slightly more than a half of the sample responded on-site (60%). The average of age was 16.65 ($M_{age} = 16.65$), and most students were between 16 and 18 of age (73%). The minimum age was 12, while the maximum age was 24. Almost a half of the student sample were in grade 12 (43%), and most students were at upper secondary level (83%). Regarding education strands, the data presented three equal proportions: science students (38%), social science students (32%), and others including seventh-to-tenth grade students who are yet to choose the education strand (30%). Most students were ordinary students (86%) rather than student leaders. Student leaders included class monitors, vice class monitors, and chief and vice chief of the student council.

Table 15

Innovation Leadership Skills Levels of the Students

Category and Component of Innovation Leadership Skills	<i>M</i>	<i>SD</i>	Level	Rank
Innovation Leadership Skills	3.73	0.927	High	
1. Innovation Vision and Strategy	3.77	0.911	High	2
1.1 Realizing innovation vision	3.69	0.886	High	8
I can clearly define new proactive approaches in my learning to achieve my goals.	3.85	0.820		
I can easily translate new proactive approaches to learning into specific activities that I can easily implement in order to achieve my goals.	3.54	0.859		
I can clearly explain to my group members the purpose of the assigned group work.	3.51	0.896		
When doing group work, I can communicate with my group members to put effort into realizing and achieving a shared goal.	3.91	0.897		
When doing group work, I regularly hold meetings with my group members to ensure they are aligned with the shared goal.	3.62	0.960		
1.2 Strategic thinking	3.99	0.909	High	1
I try to do activities that widen my learning in areas considered strategic rather than accepting the learning opportunities as they arise.	3.81	0.936		

Category and Component of Innovation Leadership Skills	<i>M</i>	<i>SD</i>	Level	Rank
I always do something with purpose.	4.26	0.836		
I'm constantly scanning my surroundings for clues that something has to change in my learning.	3.89	0.880		
I constantly analyze my strengths and weaknesses to improve my learning.	4.05	0.876		
I compare my learning performance to my peers to improve my learning.	3.94	1.018		
1.3 Managing Risk	3.63	0.937	High	10
Despite embracing new initiatives, I initiate reasonable action when potentially negative consequences are expected.	3.39	0.934		
Although I am typically bold in decision-making situations with uncertainty, I spend time analyzing a particular situation to avoid overthinking decisions.	3.59	0.933		
Although I am a risk-taker, I identify any potential risks in every decision.	3.90	0.951		
Although I like doing new projects, I anticipate the possibility of something bad that might happen in those projects.	3.69	0.920		
I formulate plans to avert risks (unpleasant things possibly happening) when doing new projects.	3.61	0.946		
2. Innovative Thinking	3.65	0.822	High	3
2.1 Demonstrating Curiosity	3.92	0.924	High	3
I constantly evaluate my current knowledge and skills.	3.76	1.025		
I seek other knowledge or skills that can help achieve long-term goals.	3.99	0.904		
I view mistakes and setbacks as learning opportunities.	4.22	0.928		
I make time for developmental activities, such as taking classes and participating in workshops.	3.62	0.993		
I put effort in making my learning better.	4.30	0.800		
I constantly ask questions to broaden my knowledge and skills.	3.89	0.878		
I am enthusiastic about learning.	3.63	0.942		
2.2 Developing Empathy for Others	3.79	0.890	High	5
I seek to understand others by listening deeply to what they want to accomplish, what problems they face, and how I might take on their problem when I engage in social service activities.	3.88	0.880		
I treat others with courtesy and sensitivity.	4.05	0.831		
I make an effort to address needs and concerns of others.	3.44	0.961		
2.3 Opportunity exploration	3.73	0.922		7
I am passionately alert to the possibility of transforming my future goals into reality.	4.04	0.858		
I am constantly looking for new opportunities to improve my learning.	4.02	0.835		
I pay attention to issues that are no part of my daily work and wonder how things can be improved.	3.50	0.938		
I ask valued peers to help undertake opportunities.	3.54	0.995		

Category and Component of Innovation Leadership Skills	M	SD	Level	Rank
I often see barriers as opportunities.	3.56	0.985		
2.4 Assaulting assumptions	3.63	0.945	High	10
I move beyond habitual thinking blocks (e.g., habitual thinking blocks include "It's always been done that way" or "we already tried that").	3.22	1.008		
I always think that "there's got to be a better way" in mind.	4.05	0.841		
If I personally have different ideas from the teacher, school management team, or other seniors, I find ways to communicate that without damaging the relationships.	3.62	0.993		
I like asking what-if and why/why-not questions (e.g., "Why don't they do it this other way?" or "What if we try a different approach to solving this problem?")	3.67	0.957		
I am open to new ideas even though those ideas are opposed to existing practices.	3.58	0.926		
2.5 Proactive thinking	3.69	0.906	High	8
I position myself to turn the surrounding trends into new opportunities by analyzing and understanding developments.	3.53	0.876		
I propose the initiative to do something new.	3.63	0.920		
I have always been an agent for positive change, no matter where I have been.	3.17	0.999		
When I see something awkward, I fix it.	3.97	0.883		
I anticipate causes and consequences of uncertain events for good opportunities.	3.67	0.909		
I am constantly looking for new ways to improve my life.	4.15	0.845		
2.6 Idea generation	3.59	0.984	High	12
I intentionally generate ideas by brainstorming and mind-mapping when doing group work or in meetings.	3.39	0.986		
I encourage peers to the idea generation process.	3.91	0.890		
I engage in activities more usually associated with leadership or entrepreneurship.	3.40	1.021		
I hold two opposing ideas in the mind at the same time and open to a third solution when discussing on a problem.	3.46	0.941		
I prefer to try new ways of solving a problem rather than accepted ways.	3.70	0.926		
I often fantasize about impossible things.	3.70	1.140		
2.7 Idea Championing	3.32	1.013	Moderate	15
I attempt to convince other people to support my innovative ideas through contacts.	3.27	1.077		
I make my peers enthusiastic for innovative ideas.	3.44	0.961		
I engage in promotional activities to gather both social (such as networks with peers or organizations) and financial resources for making my novel idea happen.	3.24	1.000		
2.8 Idea Application	3.57	0.937	High	13
I set a meeting with my peers to outline the value of change or improvements in the school on an ongoing basis.	3.35	0.986		
I engage in networking opportunities that appeal to my peers.	3.45	0.973		

Category and Component of Innovation Leadership Skills	<i>M</i>	<i>SD</i>	Level	Rank
I systematically introduce innovative ideas into practices.	3.54	0.935		
I contribute to the implementation of new ideas.	3.72	0.896		
I put effort in the development of new things.	3.80	0.897		
3. Innovation Recognition and Support	3.80	0.915	High	1
3.1 Leading courageously	3.57	0.957	High	13
I prepare to deal with other people's reactions when facing a tough decision.	3.67	0.925		
I look for an opportunity to share feelings and opinions with clarity and conviction, despite any resistance that happens to occur.	3.54	0.918		
I am assertive rather than being aggressive.	3.51	1.026		
3.2 Leading by example	3.75	0.928	High	6
When doing group work or engaging in social-service activities, I show commitment to the implementation of new ideas through various behaviors and actions.	3.66	0.890		
If I am a team leader, I take blames on behalf of my team members in implementing any new idea or project.	3.81	0.964		
When I want surrounding people to follow my new idea, I do it first as an example.	3.78	0.930		
3.3 Promoting a culture of trust	3.91	0.891	High	4
I show confidence in my team members' contributions to implement new ideas when doing a group work.	3.76	0.853		
I embrace failure as a natural part of the implementation of new ideas.	3.94	0.962		
I encourage peers to stick to their ideas.	3.98	0.894		
I find a way to help peers overcome the challenges they face.	3.94	0.857		
3.4 Recognizing the innovators	3.98	0.884	High	2
I support and motivate peers to participate in social service activities to make change.	3.91	0.874		
I praise my group members for expressing new and good ideas when doing group work.	4.08	0.850		
I provide group members with opportunities to implement their new ideas.	4.09	0.843		
I reward rather than punish innovative attempts by group members.	3.83	0.970		

Table 15 illustrates innovation leadership skills levels of the students with self-assessment. In an overall aspect, students had a high level of innovation leadership skills ($M = 3.73$). All innovation leadership skills dimensions and subdimensions were perceived at the high level, except for idea championing, which was perceived at the moderate level ($M = 3.32$, $SD = 1.013$). Among three innovation

leadership skills dimensions, innovation recognition and support were rated the highest ($M = 3.80$, $SD = 0.915$), while innovative thinking was scored the lowest ($M = 3.65$, $SD = 0.822$). Mean scores of the innovation leadership skills subdimensions were in range of 3.32-3.99 ($SD = 1.013$, $SD = 0.909$, respectively). The top three subdimensions that were rated high included strategic thinking ($M = 3.99$, $SD = 0.909$), recognizing the innovators ($M = 3.98$, $SD = 0.884$), and demonstrating curiosity ($M = 3.92$, $SD = 0.924$); while the top three subdimensions that were scored low consisted of idea championing ($M = 3.32$, $SD = 1.013$), idea application ($M = 3.57$, $SD = 0.937$), and demonstrating curiosity ($M = 3.57$, $SD = 0.957$).

Table 16

Mean, Standard Deviations, and One-Way Analyses of Variance in Innovation

Leadership Skills Dimensions

Variables/ Student Position	n	M	SD	Level	F (3,2662)		η ²	Result
					F	p		
1. Innovation Leadership Skills								
Ordinary Student (A)	2302	3.71	0.494	High	8.357	0.000	0.009	B, C > A
Class Monitor (B)	202	3.84	0.543	High				C > D
Student Council Leader (C)	107	3.89	0.507	High	Levene's test = 2.265,			
Vice class monitor (D)	51	3.65	0.503	High	df1 = 3, df2 = 2658, p = .079			
1.1 Innovation Vision and Strategy								
Ordinary Student (A)	2302	3.76	0.516	High	7.025	0.000	0.008	B, C > A
Class Monitor (B)	202	3.88	0.549	High				B, C > D
Student Council Leader (C)	107	3.92	0.527	High	Levene's test = 0.758,			
Vice class monitor (D)	51	3.68	0.538	High	df1 = 3, df2 = 2658, p = .517			
1.2 Innovative Thinking								
Ordinary Student (A)	2302	3.66	0.519	High	8.110	0.000	0.009	B, C > A
Class Monitor (B)	202	3.79	0.576	High				C > D
Student Council Leader (C)	107	3.86	0.532	High	Levene's test = 2.799,			
Vice class monitor (D)	51	3.60	0.524	High	df1 = 3, df2 = 2658, p = .039			
1.3 Innovation recognition and support								
Ordinary Student (A)	2302	3.71	0.494	High	5.791	0.001	0.006	C, B > A
Class Monitor (B)	202	3.84	0.543	High				
Student Council Leader (C)	107	3.89	0.507	High	Levene's test = 0.714,			
Vice class monitor (D)	51	3.65	0.503	High	df1 = 3, df2 = 2658, p = .543			

As shown in Table 16, the study found a statistically significant difference in students' innovation leadership skills in the overall aspect according to student positions ($F(3,2662) = 8.357, p < .001$). The post-hoc test showed that class monitors and student council leaders had higher levels of innovation leadership skills than ordinary students ($M = 3.84, M = 3.89; M = 3.71$), and student council leaders rated higher in innovation leadership skills than vice class monitors ($M = 3.89; M = 3.65$). Regarding innovation leadership skills dimensions, there is a statistically significant difference in all three dimensions, including innovation vision and strategy, innovative thinking, and innovation recognition and support, according to student positions ($F(3,2662) = 7.025, p < .001; F(3,2662) = 8.110, p < .001; F(3,2662) = 5.791, p < .01$, respectively). Across the three dimensions, class monitors and student council leaders perceived higher than ordinary students. Regarding innovation vision and strategy, class monitors and student council leaders perceived higher than ordinary students and vice class monitor ($M = 3.88, M = 3.92; M = 3.76, M = 3.68$, respectively). Regarding innovative thinking, class monitors and student council leaders perceived higher than ordinary students ($M = 3.79, M = 3.86; M = 3.66$, respectively), and student council leaders perceived higher than vice class monitors ($M = 3.86; M = 3.60$, respectively). Similarly, class monitors and student council leaders perceived innovation recognition and support higher than ordinary students ($M = 3.84, M = 3.89; M = 3.71$, respectively).

Table 17

Mean, Standard Deviations, and One-Way Analyses of Variance in Innovation

Leadership Skills Subdimensions

Variables/ Student Position	n	M	SD	Level	F (3,2662)		η^2	Result
					F	p		
1. Innovation Leadership Skills								
1.1 Innovation Vision and Strategy								
1) Realizing innovation vision								
Ordinary Student (A)	2302	3.67	0.614	High	9.008	0.000	0.010	B, C > A
Class Monitor (B)	202	3.81	0.666	High				C > D
Student Council Leader (C)	107	3.92	0.614	High	Levene's test = 1.176,			

Variables/ Student Position	n	M	SD	Level	F (3,2662)	η^2	Result
Vice class monitor (D)	51	3.62	0.602	High	df1 = 3, df2 = 2658, $p = .317$		
2) Strategic thinking							
Ordinary Student (A)	2302	3.98	0.609	High	3.214	0.022	0.004 B > A
Class Monitor (B)	202	4.07	0.596	High	B, C > D		
Student Council Leader (C)	107	4.07	0.653	High	Levene's test = 1.071,		
Vice class monitor (D)	51	3.83	0.635	High	df1 = 3, df2 = 2658, $p = .360$		
3) Managing risks							
Ordinary Student (A)	2302	3.62	0.644	High	4.070	0.007	0.005 B > A
Class Monitor (B)	202	3.75	0.667	High	B, C > D		
Student Council Leader (C)	107	3.77	0.656	High	Levene's test = 0.354,		
Vice class monitor (D)	51	3.59	0.686	High	df1 = 3, df2 = 2658, $p = .786$		
1.2 Innovative thinking							
1) Demonstrating curiosity							
Ordinary Student (A)	2302	3.90	0.589	High	5.433	0.001	0.006 C, B > A
Class Monitor (B)	202	4.03	0.564	High	C > A		
Student Council Leader (C)	107	4.06	0.536	High	Levene's test = 0.998,		
Vice class monitor (D)	51	3.82	0.491	High	df1 = 3, df2 = 2658, $p = .393$		
2) Developing empathy for others							
Ordinary Student (A)	2302	3.78	0.693	High	4.568	0.003	0.005 C > A
Class Monitor (B)	202	3.87	0.706	High	C > D		
Student Council Leader (C)	107	3.99	0.597	High	Levene's test = 2.250,		
Vice class monitor (D)	51	3.67	0.710	High	df1 = 3, df2 = 2658, $p = .081$		
3) Opportunity exploration							
Ordinary Student (A)	2302	3.71	0.614	High	5.730	0.001	0.006 C > A
Class Monitor (B)	202	3.83	0.660	High	C > A		
Student Council Leader (C)	107	3.92	0.605	High	Levene's test = 0.797,		
Vice class monitor (D)	51	3.70	0.642	High	df1 = 3, df2 = 2658, $p = .495$		
4) Assaulting assumptions							
Ordinary Student (A)	2302	3.61	0.646	High	5.319	0.001	0.006 B, C > A
Class Monitor (B)	202	3.74	0.705	High	B, C > A		
Student Council Leader (C)	107	3.81	0.694	High	Levene's test = 1.287,		
Vice class monitor (D)	51	3.65	0.631	High	df1 = 3, df2 = 2658, $p = .277$		
5) Proactive thinking							
Ordinary Student (A)	2302	3.67	0.617	High	5.350	0.001	0.006 C > A
Class Monitor (B)	202	3.77	0.683	High	C > D		
Student Council Leader (C)	107	3.87	0.569	High	Levene's test = 2.782,		
Vice class monitor (D)	51	3.56	0.652	High	df1 = 3, df2 = 2658, $p = .040$		
6) Idea generation							
Ordinary Student (A)	2302	3.58	0.641	High	3.366	0.018	0.004 B, C > A
Class Monitor (B)	202	3.67	0.671	High	B, C > D		
Student Council Leader (C)	107	3.74	0.643	High	Levene's test = 0.169,		
Vice class monitor (D)	51	3.56	0.667	High	df1 = 3, df2 = 2658, $p = .917$		
7) Idea championing							
Ordinary Student (A)	2302	3.30	0.787	Moderate	4.422	0.004	0.005 B, C > A
Class Monitor (B)	202	3.45	0.853	Moderate	B, C > D		
Student Council Leader (C)	107	3.50	0.870	Moderate	Levene's test = 1.909,		

Variables/ Student Position	n	M	SD	Level	F (3,2662)	η^2	Result
(C)							
Vice class monitor (D)	51	3.19	0.772	Moderate	df1 = 3, df2 = 2658, $p = .126$		
8) Idea application							
Ordinary Student (A)	2302	3.55	0.723	High	9.178	0.000	0.010 B, C > A
Class Monitor (B)	202	3.75	0.766	High	C > D		
Student Council Leader (C)	107	3.81	0.686	High	Levene's test = 1.306,		
Vice class monitor (D)	51	3.48	0.758	Moderate	df1 = 3, df2 = 2658, $p = .271$		
1.3 Innovation recognition and support							
1) Leading courageously							
Ordinary Student (A)	2302	3.55	0.730	High	5.791	0.001	0.006 C, B > A
Class Monitor (B)	202	3.72	0.749	High			
Student Council Leader (C)	107	3.67	0.756	High	Levene's test = 0.714,		
Vice class monitor (D)	51	3.42	0.822	High	df1 = 3, df2 = 2658, $p = .543$		
2) Leading by example							
Ordinary Student (A)	2302	3.73	0.723	High	8.427	0.000	0.009 C, B > A
Class Monitor (B)	202	3.95	0.723	High			
Student Council Leader (C)	107	3.95	0.731	High	Levene's test = 1.418,		
Vice class monitor (D)	51	3.75	0.606	High	df1 = 3, df2 = 2658, $p = .236$		
3) Promoting a culture of trust							
Ordinary Student (A)	2302	3.89	0.660	High	4.477	0.004	0.005 C > A
Class Monitor (B)	202	4.00	0.668	High			
Student Council Leader (C)	107	4.08	0.637	High	Levene's test = 0.189,		
Vice class monitor (D)	51	3.85	0.664	High	df1 = 3, df2 = 2658, $p = .904$		
4) Recognizing innovators							
Ordinary Student (A)	2302	3.97	0.680	High	1.790	0.147	0.002 A = B = C = D
Class Monitor (B)	202	4.04	0.643	High			
Student Council Leader (C)	107	4.09	0.667	High	Levene's test = 0.187,		
Vice class monitor (D)	51	3.92	0.686	High	df1 = 3, df2 = 2658, $p = .906$		

Table 17 shows that there is a statistically significant difference in all subdimensions of innovation leadership skills in students, except for recognizing innovators ($F(3,2662) = 1.790, p = .147 > .05$). Among 14 skills found a statistically difference, class monitors and student council leaders rated higher than ordinary students for eight skills, including realizing innovation vision ($M = 3.81, M = 3.92; M = 3.67$, respectively), demonstrating curiosity ($M = 4.03, M = 4.06; M = 3.90$, respectively), assaulting assumptions ($M = 3.74, M = 3.81; M = 3.61$, respectively), idea generation ($M = 3.67, M = 3.74; M = 3.58$, respectively), idea championing ($M = 3.45, M = 3.50; M = 3.30$,

respectively), idea application ($M = 3.75$, $M = 3.81$; $M = 3.55$, respectively), leading courageously ($M = 3.72$, $M = 3.67$; $M = 3.55$, respectively), and leading by example ($M = 3.95$, $M = 3.95$; $M = 3.73$, respectively). Student council leaders perceived higher than vice class monitors for six skills: realizing innovation vision ($M = 3.92$; $M = 3.62$, respectively), strategic thinking ($M = 4.07$; $M = 3.83$, respectively), developing empathy for others ($M = 3.99$; $M = 3.67$, respectively), proactive thinking ($M = 3.87$; $M = 3.56$, respectively), idea championing ($M = 3.92$; $M = 3.62$, respectively), and idea application ($M = 3.50$; $M = 3.19$, respectively).

4.3 Strengths, Weaknesses, Opportunities, and Threats (SWOT) of Academic Management Based on Concept of Innovation Leadership Skills

This section is to determine strengths, weaknesses, opportunities, and threats (SWOT) of academic management based on concept of innovation leadership skills. Results of data analysis are presented in terms of demographic data, current and desirable states, and priority needs of internal and external environments.

The midrange value is used to determine between strengths and weaknesses as well as between opportunities and threats. The midrange value is calculated by adding the highest and the lowest values of PNI_{modified} in the data set and then divide the result by two.

Table 18

Demographic Information of the Respondents (n = 463)

Variables	Frequency, n (%)		
	Female	Male	Total
Province (Region)			
Phnom Penh (Central)	58 (30.69)	131 (69.31)	189 (40.82)
Kandal (Central)	16 (30.77)	36 (69.23)	52 (11.23)
Kampong Cham (Central)	20 (39.22)	31 (60.78)	51 (11.02)

Variables	Frequency, <i>n</i> (%)		
	Female	Male	Total
Svay Rieng (East)	8 (25.81)	23 (74.19)	31 (6.7)
Banteay Meanchey (North)	7 (38.89)	11 (61.11)	18 (3.89)
Krachah (Northeast)	6 (37.50)	10 (62.50)	16 (3.46)
Battambang (Northwest)	5 (21.74)	18 (78.26)	23 (4.97)
Takeo (Southwest)	11 (34.38)	21 (65.63)	32 (6.91)
Kampong Speu (West)	13 (25.49)	38 (74.51)	51 (11.02)
Gender			
Female			144 (31.1)
Male			319 (68.9)
Age			
30 and less	20 (55.56)	16 (44.44)	36 (7.78)
31-40	65 (36.11)	115 (63.89)	180 (38.88)
41-50	32 (22.86)	108 (77.14)	140 (30.24)
Greater than 50	27 (25.23)	80 (74.77)	107 (23.11)
Education Level			
Associate	6 (35.29)	11 (64.71)	17 (3.67)
Bachelor	96 (64.71)	212 (68.83)	308 (66.52)
Master	20 (20.41)	78 (79.59)	98 (21.17)
Doctoral	0 (0)	2 (100)	2 (0.43)
Others (Grade 12)	22 (57.89)	16 (42.11)	38 (8.21)
Work Experience (Years)			
5 and less	12 (23.08)	40 (76.92)	52 (11.23)
6-10	28 (32.56)	58 (67.44)	86 (18.57)
11-15	32 (36.36)	56 (63.64)	88 (19.01)
16-20	25 (30.86)	56 (69.14)	81 (17.49)
Greater than 20	47 (30.13)	109 (69.87)	156 (33.69)
Position			
School Director	2 (4.44)	43 (95.56)	45 (9.72)
Vice School Director	9 (14.06)	55 (85.94)	64 (13.82)
Teacher	133 (37.57)	221 (62.43)	354 (76.46)
School Size			
20 and less (small)	38 (34.86)	71 (65.14)	109 (23.54)
21-40 (medium)	63 (25.93)	180 (74.07)	243 (52.48)
Greater than 40 (large)	43 (38.74)	68 (61.26)	111 (23.97)
Subject Taught			
Khmer Language	28 (41.79)	39 (58.21)	67 (18.93)
Foreign Languages	14 (35.90)	25 (64.10)	39 (11.02)
Mathematics	13 (18.84)	56 (81.16)	69 (19.49)
Physics	6 (20.69)	23 (79.31)	29 (8.19)
Chemistry	10 (41.67)	14 (58.33)	24 (6.78)
Biology	13 (54.17)	11 (45.83)	24 (6.78)
History	12 (66.67)	6 (33.33)	18 (5.08)
Earth-Environmental Science	6 (46.15)	7 (53.85)	13 (3.67)

Variables	Frequency, <i>n</i> (%)		
	Female	Male	Total
Geography	13 (50)	13 (50)	26 (7.34)
Moral-Civics	7 (38.89)	11 (61.11)	18 (5.08)
Home Economics	8 (66.67)	4 (33.33)	12 (3.39)
Information Communication Technology (ICT)	1 (16.67)	5 (83.33)	6 (1.69)
Health and Sports	0 (0)	6 (100)	6 (1.69)
Art Education	2 (66.67)	1 (33.33)	3 (0.85)
Grade Taught			
Grade 7	11 (40.74)	16 (59.26)	27 (7.63)
Grade 8	15 (42.86)	20 (57.14)	35 (9.89)
Grade 9	25 (49.02)	26 (50.98)	51 (14.41)
Grade 10	19 (37.25)	32 (62.75)	51 (14.41)
Grade 11	22 (40)	33 (60)	55 (15.54)
Grade 12	41 (30.37)	94 (69.63)	135 (38.14)
Education Strand (for grade 10-12)			
Science	33 (30.56)	75 (69.44)	108 (30.51)
Social Science	26 (35.62)	47 (64.38)	73 (20.62)
Both	11 (28.21)	28 (71.79)	39 (11.02)
Others (Grade 7-10)	55 (41.04)	79 (58.96)	164 (37.85)

Note. Number of schools = 94 (see Chapter 3 for detail). Data were collected online (42.55 %) and on-site (57.45%).

Table 18 indicates that about a half of the respondents were from the central region (62%). Most of respondents were male (69%). The majority of the respondents were between 31 and 50 of age (69%), while only about 8% were 30 or less of age. Most of the respondents held bachelor's degrees (66%). Master's degree holders were accounted for 21 percent (21%). Only two respondents had doctoral degrees (0.46%). One third of the respondents have been working for more than 20 years (34%); another one third had work experience in the range of 11-20 of years. Two third of the respondents were teachers (76%), while one third were school directors and vice school directors (24%). About a half of the respondents came from medium-sized schools (52%), and another half was a combination of small (24%) and large schools (24%). Teachers taught across all 14 subjects. However, most of the teachers taught

Mathematics (19%), Khmer Language (19%), and Foreign Languages (11%), accounted for about a half of the teacher respondents (49%). About one third of the teachers taught grade 12 (38%). Teachers of grades 9, 10, and 11 were equally proportional (14%, 14%, and 16% respectively). About one third of the teachers taught science classes (31%), and another one third taught social science classes (21%) and both (11%).

In the data set of dimensions and subdimensions of academic management, the midrange value is calculated as follows:

$$\text{Midrange} = \text{PNI}_{\text{modified}} [(0.333 + 0.317)/2 = 0.325]$$

$$\text{High group: PNI}_{\text{modified}} \text{ was in range of } 0.326-0.333 = \text{Weakness}$$

$$\text{Low group: PNI}_{\text{modified}} \text{ was in range of } 0.317-0.325 = \text{Strength}$$

$$\text{Midrange} = \text{PNI}_{\text{modified}} [(0.334 + 0.310)/2 = 0.322]$$

$$\text{High group: PNI}_{\text{modified}} \text{ was in range of } 0.323-0.334 = \text{Weakness}$$

$$\text{Low group: PNI}_{\text{modified}} \text{ was in range of } 0.310-0.322 = \text{Strength}$$

Table 19

Current State, Desirable State, Priority Needs, and Internal Environmental Analysis

Results of Academic Management Based on the Concept of Innovation Leadership

Skills in Overall (n = 463)

Academic Management Based on the Concept of Innovation Leadership Skills	Internal Environment (Overall)							SWOT Result
	Current State		Desirable State		Priority Needs		High/ Low Group	
	M	SD	M	SD	PNI _{Modified}	Rank		
Academic Management	3.18	0.822	4.22	0.857				
1. Curriculum Development	3.20	0.827	4.21	0.866	0.317	3	Low	S
1.1 Identify student learning outcomes in the curriculum	3.21	0.828	4.20	0.870	0.310	5	Low	S
1.2 Use student learning outcomes	3.19	0.825	4.22	0.861	0.324	4	High	W

Academic Management Based on the Concept of Innovation Leadership Skills	Internal Environment (Overall)							SWOT Result
	Current State		Desirable State		Priority Needs		High/ Low Group	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	$PNI_{Modified}$	Rank		
in subject development								
2. Teaching and Learning	3.17	0.820	4.22	0.852	0.333	1	High	W
2.1 Use learning media and resources	3.15	0.822	4.20	0.866	0.334	1	High	W
2.2 Organize learning activities	3.19	0.817	4.24	0.839	0.332*	3	High	W
3. Measurement and Evaluation	3.18	0.819	4.24	0.852	0.332	2	High	W
3.1 Measure and evaluate student learning outcomes	3.18	0.819	4.24	0.852	0.332*	2	High	W

Note. W = Weakness, S = Strength. $*PNI_{Modified}$ of organize learning activities = 0.3322, while $PNI_{Modified}$ of measure and evaluate student learning outcomes = 0.3324.

Table 19 illustrates that in overall aspect teaching and learning and measurement and evaluation were weaknesses ($PNI_{modified} = 0.333$, $PNI_{modified} = 0.332$, respectively), while curriculum development was the strength ($PNI_{modified} = 0.317$). Regarding subdimensions of academic management, only “identifying student learning outcomes in the curriculum” was the strength ($PNI_{modified} = 0.310$). “Using learning media and resources” was the weakness with the highest value of $PNI_{modified}$ ($PNI_{modified} = 0.334$).

In the data set of dimensions and subdimensions of innovation leadership skills, the midrange value is calculated as follows:

Dimensions:

$$\text{Midrange} = PNI_{modified} [(0.360 + 0.307)/2 = 0.333]$$

High group: $PNI_{modified}$ was in range of 0.334-0.360 = Weakness

Low group: $PNI_{modified}$ was in range of 0.307-0.333 = Strength

Subdimensions:

$$\text{Midrange} = PNI_{modified} [(0.375 + 0.296)/2 = 0.335]$$

High group: PNI_{modified} was in range of 0.336-0.375 = Weakness

Low group: PNI_{modified} was in range of 0.296-0.335 = Strength

Table 20

Current State, Desirable State, Priority Needs, and Internal Environmental Analysis

Results of Academic Management Based on the Concept of Innovation Leadership

Skills Regarding Dimensions and Subdimensions of Innovation Leadership Skills (n = 463)

Innovation Leadership Skills	Internal Environment						High/ Low Group	SWOT Result
	Current State		Desirable State		Priority Needs			
	M	SD	M	SD	PNI_{modified}	Rank		
1. Innovation Vision and Strategy	3.05	0.792	4.14	0.879	0.360	1	High	W
1.1 Realizing innovation vision	3.01	0.783	4.14	0.852	0.375	1	High	W
1.2 Strategic thinking	3.07	0.781	4.17	0.849	0.357	2	High	W
1.3 Managing risk	3.05	0.812	4.11	0.936	0.349	3	High	W
2. Innovative Thinking	3.18	0.824	4.22	0.864	0.324	2	Low	S
2.1 Demonstrating curiosity	3.30	0.813	4.31	0.817	0.306	12	Low	S
2.2 Developing empathy for others	3.14	0.816	4.20	0.862	0.338	4	High	W
2.3 Opportunity exploration	3.17	0.826	4.24	0.832	0.337	5	High	W
2.4 Assaulting assumptions	2.96	0.810	3.94	1.008	0.332	8	Low	S
2.5 Proactive thinking	3.21	0.814	4.25	0.846	0.322	9	Low	S
2.6 Idea generation	3.25	0.841	4.28	0.848	0.318	10	Low	S
2.7 Idea championing	3.26	0.852	4.27	0.851	0.311	11	Low	S
2.8 Idea application	3.19	0.821	4.26	0.843	0.332	7	Low	S
3. Innovation Recognition and Support	3.28	0.842	4.28	0.829	0.307	3	Low	S
3.1 Leading courageously	3.34	0.850	4.33	0.818	0.297	14	Low	S
3.2 Leading by example	3.33	0.865	4.31	0.834	0.296	15	Low	S
3.3 Promoting a culture of trust	3.30	0.838	4.31	0.814	0.305	13	Low	S
3.4 Recognizing the innovators	3.14	0.814	4.19	0.852	0.333	6	Low	S

Note. W = Weakness, S = Strength.

Table 20 shows that regarding dimensions of the innovation leadership skills dimension of innovation vision and strategy was the weakness ($PNI_{\text{modified}} = 0.360$), while innovation recognition and support and innovative thinking were the strengths

($PNI_{\text{modified}} = 0.307$, $PNI_{\text{modified}} = 0.324$, respectively). Among 15 subdimensions of innovation leadership skills, five subdimensions, including realizing innovation vision, strategic thinking, managing risk, developing empathy for others, and opportunity exploration were the weaknesses. All three components of the innovation vision and strategy dimension (i.e., realizing innovation vision, strategic thinking, and managing risk) were the weaknesses with high PNI_{modified} ($PNI_{\text{modified}} = 0.375$, $PNI_{\text{modified}} = 0.357$, $PNI_{\text{modified}} = 0.305$, respectively). Three components of the innovation recognition and support (i.e., leading by example, leading courageously, and promoting a culture of trust) were the strengths with low PNI_{modified} ($PNI_{\text{modified}} = 0.296$, $PNI_{\text{modified}} = 0.297$, $PNI_{\text{modified}} = 0.349$, respectively).

In the data set of curriculum development, the midrange value is calculated as follows:

Dimensions:

$$\text{Midrange} = PNI_{\text{modified}} [(0.355 + 0.297)/2 = 0.326]$$

High group: PNI_{modified} was in range of 0.327-0.355 = Weakness

Low group: PNI_{modified} was in range of 0.297-0.326 = Strength

Subdimensions:

$$\text{Midrange} = PNI_{\text{modified}} [(0.281 + 0.368)/2 = 0.324]$$

High group: PNI_{modified} was in range of 0.325-0.368 = Weakness

Low group: PNI_{modified} was in range of 0.281-0.324 = Strength

In the data set of teaching and learning, the midrange value is calculated as follows:

Dimensions:

$$\text{Midrange} = PNI_{\text{modified}} [(0.363 + 0.314)/2 = 0.338]$$

Academic Management	Internal Environment							High/ Low Group	SWOT Result
	Current State		Desirable State		Priority Needs				
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>PNI_{Modified}</i>	Rank			
1) Curriculum Development	3.20	0.827	4.21	0.866	0.317	3	Low	S	
1. Innovation Vision and Strategy	3.05	0.797	4.12	0.893	0.355	1	High	W	
1.1 Realizing innovation vision	3.01	0.784	4.12	0.853	0.368	1	High	W	
1.2 Strategic thinking	3.05	0.776	4.14	0.861	0.358	2	High	W	
1.3 Managing risk	3.05	0.835	4.09	0.964	0.338	3	High	W	
2. Innovative Thinking	3.21	0.825	4.20	0.872	0.314	2	Low	S	
2.1 Demonstrating curiosity	3.37	0.800	4.34	0.809	0.287	13	Low	S	
2.2 Developing empathy for others	3.16	0.815	4.19	0.883	0.327	8	High	W	
2.3 Opportunity exploration	3.16	0.838	4.21	0.861	0.332	5	High	W	
2.4 Assaulting assumptions	2.91	0.819	3.86	1.017	0.328	7	High	W	
2.5 Proactive thinking	3.25	0.818	4.24	0.852	0.302	10	Low	S	
2.6 Idea generation	3.27	0.848	4.28	0.846	0.309	9	Low	S	
2.7 Idea championing	3.29	0.845	4.27	0.854	0.297	11	Low	S	
2.8 Idea application	3.19	0.826	4.25	0.852	0.331	6	High	W	
3. Innovation Recognition and Support	3.31	0.857	4.29	0.833	0.297	3	Low	S	
3.1 Leading courageously	3.39	0.862	4.35	0.818	0.285	14	Low	S	
3.2 Leading by example	3.38	0.883	4.33	0.839	0.281	15	Low	S	
3.3 Promoting a culture of trust	3.33	0.824	4.30	0.816	0.294	12	Low	S	
3.4 Recognizing the innovators	3.12	0.826	4.16	0.858	0.333	4	High	W	
2) Teaching and Learning	3.17	0.820	4.22	0.852	0.333	1	High	W	
1. Innovation Vision and Strategy	3.05	0.787	4.15	0.867	0.363	1	High	W	
1.1 Realizing innovation vision	3.01	0.784	4.15	0.845	0.379	1	High	W	
1.2 Strategic thinking	3.09	0.784	4.18	0.845	0.352	3	High	W	
1.3 Managing risk	3.03	0.793	4.12	0.912	0.359	2	High	W	
2. Innovative Thinking	3.17	0.824	4.22	0.862	0.332	2	Low	S	
2.1 Demonstrating curiosity	3.25	0.826	4.29	0.826	0.318	12	Low	S	
2.2 Developing empathy for others	3.12	0.820	4.20	0.851	0.346	4	High	W	
2.3 Opportunity exploration	3.17	0.809	4.25	0.816	0.342	5	High	W	
2.4 Assaulting assumptions	2.97	0.798	3.98	1.005	0.340	6	Low	S	
2.5 Proactive thinking	3.18	0.807	4.26	0.846	0.339	7	Low	S	
2.6 Idea generation	3.23	0.845	4.27	0.846	0.321	10	Low	S	
2.7 Idea championing	3.23	0.860	4.26	0.860	0.320	11	Low	S	
2.8 Idea application	3.19	0.824	4.26	0.846	0.332	9	Low	S	
3. Innovation Recognition and Support	3.26	0.836	4.28	0.821	0.314	3	Low	S	
3.1 Leading courageously	3.31	0.852	4.32	0.808	0.303	15	Low	S	
3.2 Leading by example	3.29	0.854	4.31	0.826	0.307	14	Low	S	
3.3 Promoting a culture of trust	3.28	0.845	4.30	0.808	0.311	13	Low	S	

Academic Management	Internal Environment							High/ Low Group	SWOT Result
	Current State		Desirable State		Priority Needs				
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	$PNI_{Modified}$	Rank			
3.4 Recognizing the innovators	3.14	0.794	4.19	0.844	0.337	8	Low	S	
3) Measurement and Evaluation	3.18	0.819	4.24	0.852	0.332	2	High	W	
1. Innovation Vision and Strategy	3.06	0.790	4.17	0.876	0.558	1	High	W	
1.1 Realizing innovation vision	3.03	0.778	4.17	0.866	0.379	1	High	W	
1.2 Strategic thinking	3.08	0.787	4.21	0.835	0.366	2	High	W	
1.3 Managing risk	3.06	0.805	4.13	0.928	0.350	3	High	W	
2. Innovative Thinking	3.18	0.821	4.24	0.850	0.526	2	Low	S	
2.1 Demonstrating curiosity	3.24	0.814	4.28	0.815	0.321	11	Low	S	
2.2 Developing empathy for others	3.14	0.809	4.21	0.840	0.344	4	High	W	
2.3 Opportunity exploration	3.18	0.837	4.26	0.808	0.339	5	Low	S	
2.4 Assaulting assumptions	3.02	0.815	4.01	0.995	0.325	10	Low	S	
2.5 Proactive thinking	3.20	0.821	4.25	0.835	0.331	7	Low	S	
2.6 Idea generation	3.24	0.818	4.30	0.857	0.330	8	Low	S	
2.7 Idea championing	3.25	0.850	4.29	0.829	0.319	12	Low	S	
2.8 Idea application	3.20	0.804	4.28	0.820	0.336	6	Low	S	
3. Innovation Recognition and Support	3.27	0.838	4.29	0.838	0.512	3	Low	S	
3.1 Leading courageously	3.29	0.822	4.31	0.839	0.308	14	Low	S	
3.2 Leading by example	3.30	0.850	4.31	0.838	0.303	15	Low	S	
3.3 Promoting a culture of trust	3.28	0.853	4.33	0.821	0.318	13	Low	S	
3.4 Recognizing the innovators	3.18	0.829	4.22	0.855	0.326	9	Low	S	

Note. W = Weakness, S = Strength.

Table 21 shows the same pattern of curriculum development, teaching and learning, and measurement and evaluation regarding dimensions of innovation leadership skills. Regarding curriculum development, teaching and learning, and measurement and evaluation, innovation vision and strategy dimensions were the weaknesses ($PNI_{modified} = 0.355$, $PNI_{modified} = 0.363$, $PNI_{modified} = 0.558$, respectively), while innovation recognition and support and innovative thinking were the strengths ($PNI_{modified} = 0.297$, $PNI_{modified} = 0.314$, $PNI_{modified} = 0.512$; $PNI_{modified} = 0.355$, $PNI_{modified} = 0.314$, $PNI_{modified} = 0.332$, respectively). Subdimensions with high $PNI_{modified}$ fell into the three components of the innovation vision and strategy,

including realizing innovation vision, strategic thinking, and managing risk, among curriculum development ($PNI_{\text{modified}} = 0.368$, $PNI_{\text{modified}} = 0.358$, $PNI_{\text{modified}} = 0.338$, respectively), teaching and learning ($PNI_{\text{modified}} = 0.379$, $PNI_{\text{modified}} = 0.352$, $PNI_{\text{modified}} = 0.359$, respectively), and measurement and evaluation ($PNI_{\text{modified}} = 0.379$, $PNI_{\text{modified}} = 0.366$, $PNI_{\text{modified}} = 0.350$, respectively). In contrast, subdimensions with low PNI_{modified} fell into the three components of innovation recognition and support, including leading courageously, leading by example, and promoting a culture of trust among teaching and learning ($PNI_{\text{modified}} = 0.303$, $PNI_{\text{modified}} = 0.307$, $PNI_{\text{modified}} = 0.311$, respectively) and measurement and evaluation ($PNI_{\text{modified}} = 0.303$, $PNI_{\text{modified}} = 0.307$, $PNI_{\text{modified}} = 0.311$, respectively).

In the data set of external environments, the midrange value is calculated as follows:

$$\text{Midrange} = PNI_{\text{modified}} [(0.348 + 0.334)/2 = 0.341]$$

High group: PNI_{modified} was in range of 0.342-0.348 = Threat

Low group: PNI_{modified} was in range of 0.334-0.341 = Opportunity

Table 22

Current State, Desirable State, Priority Needs, and External Environmental Analysis Results of Academic Management Based on the Concept of Innovation Leadership Skills Influenced by External Environments in an Overall Aspect (n = 463)

External Environments	External Environment (Overall)							High/Low Group	SWOT Result
	Current State		Desirable State		Priority Needs				
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	PNI_{modified}	Rank			
1. Political-legal	3.18	0.809	4.24	0.846	0.334	4	Low	O	
2. Economic	3.18	0.830	4.27	0.829	0.343	3	High	T	

External Environments	External Environment (Overall)							High/ Low Group	SWOT Result
	Current State		Desirable State		Priority Needs				
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	$PNI_{Modified}$	Rank			
3. Socio-cultural	3.16	0.822	4.26	0.824	0.348	1	High	T	
4. Technological	3.17	0.836	4.27	0.828	0.346	2	High	T	

Note. O = Opportunity, T = Threat.

Table 22 reveals that in overall aspect only the political-legal factor was the opportunity ($PNI_{modified} = 0.334$), while the other three were the threats, including socio-cultural, technological, and economic factors ($PNI_{modified} = 0.348$, $PNI_{modified} = 0.346$, $PNI_{modified} = 0.343$, respectively).

In the data set of curriculum development and the political-legal factor, the midrange value is calculated as follows:

Dimensions:

$$\text{Midrange} = PNI_{modified} [(0.338 + 0.321)/2 = 0.329]$$

High group: $PNI_{modified}$ was in range of 0.330-0.338 = Threat

Low group: $PNI_{modified}$ was in range of 0.321-0.329 = Opportunity

Subdimensions:

$$\text{Midrange} = PNI_{modified} [(0.347 + 0.311)/2 = 0.329]$$

High group: $PNI_{modified}$ was in range of 0.330-0.347 = Threat

Low group: $PNI_{modified}$ was in range of 0.311-0.329 = Opportunity

Table 23

Current State, Desirable State, Priority Needs, and External Environmental Analysis Results of Academic Management Based on the Concept of Innovation Leadership Skills Regarding Curriculum Development Influenced by Political-Legal Factors (n = 463)

Academic Management Based on the Concept of Innovation Leadership Skills: Curriculum Development	External Environment (Political-Legal Factors)							High/ Low Group	SWOT Result
	Current State		Desirable State		Priority Needs				
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	$PNI_{Modified}$	Rank			
Curriculum Development	3.18	0.813	4.23	0.860	0.330	4	Low	O	
1. Innovation Vision and Strategy	3.12	0.789	4.18	0.867	0.338	1	High	T	
1.1 Realizing innovation vision	3.14	0.768	4.20	0.841	0.334	5	High	T	
1.2 Strategic thinking	3.13	0.804	4.15	0.916	0.345	2	High	T	
1.3 Managing risk	3.11	0.796	4.29	0.833	0.334	5	High	T	
2. Innovative Thinking	3.17	0.807	4.18	0.875	0.332	2	Low	O	
2.1 Demonstrating curiosity	3.22	0.792	4.29	0.833	0.330	9	High	T	
2.2 Developing empathy for others	3.12	0.770	4.20	0.841	0.347	1	High	T	
2.3 Opportunity exploration	3.19	0.809	4.26	0.836	0.336	4	High	T	
2.4 Assaulting assumptions	3.02	0.795	4.01	1.018	0.327	11	Low	O	
2.5 Proactive thinking	3.20	0.811	4.26	0.828	0.332	8	High	T	
2.6 Idea generation	3.20	0.844	4.25	0.857	0.330	9	High	T	
2.7 Idea championing	3.24	0.812	4.28	0.851	0.320	13	Low	O	
2.8 Idea application	3.21	0.823	4.28	0.839	0.333	7	High	T	
3. Innovation Recognition and Support	3.24	0.844	4.28	0.843	0.321	3	Low	O	
3.1 Leading courageously	3.26	0.863	4.31	0.839	0.323	12	Low	O	
3.2 Leading by example	3.28	0.850	4.30	0.832	0.311	15	Low	O	
3.3 Promoting a culture of trust	3.25	0.818	4.26	0.848	0.312	14	Low	O	
3.4 Recognizing the innovators	3.16	0.845	4.23	0.854	0.341	3	High	T	

Note. O = Opportunity, T = Threat.

Table 23 illustrates that in overall aspects the political-legal factors enabled curriculum development to develop students' innovation leadership skills as the opportunity ($PNI_{modified} = 0.330$). Regarding dimensions and subdimensions of innovation leadership skills, innovation vision and strategy were the threat ($PNI_{modified}$

= 0.338), while innovation recognition and support and innovative thinking were the opportunities ($PNI_{\text{modified}} = 0.321$, $PNI_{\text{modified}} = 0.332$, respectively). All components of the innovation vision and strategy were the threats. Top three subdimensions with high PNI_{modified} included developing empathy for others, strategic thinking, and recognizing the innovators ($PNI_{\text{modified}} = 0.347$, $PNI_{\text{modified}} = 0.345$, $PNI_{\text{modified}} = 0.341$, respectively). Top three subdimensions with low PNI_{modified} included leading by example, promoting a culture of trust, and idea championing ($PNI_{\text{modified}} = 0.311$, $PNI_{\text{modified}} = 0.312$, $PNI_{\text{modified}} = 0.320$, respectively).

In the data set of curriculum development and the economic factor, the midrange value is calculated as follows:

Dimensions:

$$\text{Midrange} = PNI_{\text{modified}} [(0.351 + 0.332)/2 = 0.341]$$

High group: PNI_{modified} was in range of 0.342-0.351 = Threat

Low group: PNI_{modified} was in range of 0.332-0.341 = Opportunity

Subdimensions:

$$\text{Midrange} = PNI_{\text{modified}} [(0.364 + 0.322)/2 = 0.343]$$

High group: PNI_{modified} was in range of 0.344-0.364 = Threat

Low group: PNI_{modified} was in range of 0.322-0.343 = Opportunity

Table 24

Current State, Desirable State, Priority Needs, and External Environmental Analysis Results of Academic Management Based on the Concept of Innovation Leadership Skills Regarding Curriculum Development Influenced by Economic Factors (n = 463)

Academic Management Based on the Concept of Innovation Leadership Skills: Curriculum Development	External Environment (Economic Factors)							
	Current State		Desirable State		Priority Needs		High/ Low Group	SWOT Result
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	$PNI_{Modified}$	Rank		
Curriculum Development	3.19	0.833	4.27	0.830	0.337	3	Low	O
1. Innovation Vision and Strategy	3.12	0.809	4.21	0.857	0.351	1	High	T
1.1 Realizing innovation vision	3.11	0.807	4.22	0.837	0.355	2	High	T
1.2 Strategic thinking	3.17	0.798	4.22	0.853	0.334	9	Low	O
1.3 Managing risk	3.07	0.823	4.19	0.881	0.364	1	High	T
2. Innovative Thinking	3.19	0.830	4.26	0.837	0.335	2	Low	O
2.1 Demonstrating curiosity	3.26	0.814	4.32	0.824	0.322	15	Low	O
2.2 Developing Empathy for others	3.17	0.827	4.23	0.853	0.336	7	Low	O
2.3 Opportunity exploration	3.19	0.827	4.30	0.814	0.348	3	High	T
2.4 Assaulting assumptions	3.06	0.849	4.07	0.988	0.329	12	Low	O
2.5 Proactive thinking	3.18	0.826	4.26	0.807	0.338	6	Low	O
2.6 Idea generation	3.22	0.815	4.30	0.811	0.334	9	Low	O
2.7 Idea championing	3.22	0.833	4.29	0.831	0.330	11	Low	O
2.8 Idea application	3.22	0.852	4.32	0.768	0.341	5	Low	O
3. Innovation Recognition and Support	3.24	0.854	4.32	0.797	0.332	3	Low	O
3.1 Leading courageously	3.29	0.849	4.35	0.770	0.323	14	Low	O
3.2 Leading by example	3.27	0.869	4.33	0.796	0.325	13	Low	O
3.3 Promoting a culture of trust	3.24	0.850	4.33	0.804	0.335	8	Low	O
3.4 Recognizing the innovators	3.18	0.850	4.27	0.819	0.345	4	High	T

Note. O = Opportunity, T = Threat.

Table 24 shows that the economic factor was the opportunity for curriculum development ($PNI_{Modified} = 0.337$). For the economic factor, innovation vision and strategy were the threat ($PNI_{Modified} = 0.351$), while innovation recognition and support and innovative thinking were the opportunities ($PNI_{Modified} = 0.332$, $PNI_{Modified} =$

0.335, respectively). Top three subdimensions with high PNI_{modified} included managing risk, realizing innovation vision, and opportunity exploration ($PNI_{\text{modified}} = 0.364$, $PNI_{\text{modified}} = 0.355$, $PNI_{\text{modified}} = 0.348$, respectively). Top three subdimensions with low PNI_{modified} included demonstrating curiosity, leading courageously, and leading by example ($PNI_{\text{modified}} = 0.322$, $PNI_{\text{modified}} = 0.323$, $PNI_{\text{modified}} = 0.325$, respectively).

In the data set of curriculum development and the sociocultural factor, the midrange value is calculated as follows:

Dimensions:

$$\text{Midrange} = PNI_{\text{modified}} [(0.363 + 0.336)/2 = 0.349]$$

High group: PNI_{modified} was in range of 0.350-0.363 = Threat

Low group: PNI_{modified} was in range of 0.336-0.349 = Opportunity

Subdimensions:

$$\text{Midrange} = PNI_{\text{modified}} [(0.381 + 0.332)/2 = 0.356]$$

High group: PNI_{modified} was in range of 0.357-0.381 = Threat

Low group: PNI_{modified} was in range of 0.332-0.356 = Opportunity

Table 25

Current State, Desirable State, Priority Needs, and External Environmental Analysis Results of Academic Management Based on the Concept of Innovation Leadership Skills Regarding Curriculum Development Influenced by Sociocultural Factors (n = 463)

Academic Management Based on the Concept of Innovation Leadership Skills: Curriculum Development	External Environment (Sociocultural Factors)							High/ Low Group	SWOT Result
	Current State		Desirable State		Priority Needs				
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>PNI</i> _{Modified}	Rank			
Curriculum Development	3.17	0.834	4.27	0.816	0.347	1	High	T	
1. Innovation Vision and Strategy	3.11	0.819	4.24	0.813	0.363	1	High	T	
1.1 Realizing innovation vision	3.08	0.807	4.23	0.808	0.372	2	High	T	
1.2 Strategic thinking	3.14	0.810	4.28	0.795	0.365	3	High	T	
1.3 Managing risk	3.11	0.839	4.21	0.835	0.353	5	Low	O	
2. Innovative Thinking	3.17	0.830	4.26	0.820	0.347	2	Low	O	
2.1 Demonstrating curiosity	3.24	0.839	4.34	0.773	0.338	12	Low	O	
2.2 Developing empathy for others	3.07	0.816	4.24	0.808	0.381	1	High	T	
2.3 Opportunity exploration	3.19	0.832	4.27	0.833	0.339	10	Low	O	
2.4 Assaulting assumptions	3.05	0.836	4.10	0.965	0.342*	7	Low	O	
2.5 Proactive thinking	3.16	0.831	4.28	0.807	0.355	4	Low	O	
2.6 Idea generation	3.20	0.820	4.30	0.804	0.342*	7	Low	O	
2.7 Idea championing	3.21	0.835	4.30	0.778	0.339	10	Low	O	
2.8 Idea application	3.20	0.835	4.29	0.798	0.341	9	Low	O	
3. Innovation Recognition and Support	3.22	0.854	4.30	0.810	0.336	3	Low	O	
3.1 Leading courageously	3.23	0.827	4.30	0.801	0.332	15	Low	O	
3.2 Leading by example	3.24	0.858	4.32	0.797	0.335	13	Low	O	
3.3 Promoting a culture of trust	3.23	0.876	4.32	0.822	0.335	13	Low	O	
3.4 Recognizing the innovators	3.17	0.854	4.26	0.820	0.344	6	Low	O	

Note. O = Opportunity, T = Threat. **PNI*_{modified} of assaulting assumptions = 0.3418, *PNI*_{modified} of Idea

Generation = 03421.

Table 25 shows that the sociocultural factor was the threat for curriculum development (*PNI*_{modified} = 0.347). For the sociocultural factor, dimension of innovation vision and strategy was the threat (*PNI*_{modified} = 0.363), while innovation

recognition and support and innovative thinking were the opportunities ($PNI_{\text{modified}} = 0.336$, $PNI_{\text{modified}} = 0.347$, respectively). Top three subdimensions with high PNI_{modified} included developing empathy for others, realizing innovation vision, and strategic thinking ($PNI_{\text{modified}} = 0.381$, $PNI_{\text{modified}} = 0.372$, $PNI_{\text{modified}} = 0.365$, respectively). Top three subdimensions with low PNI_{modified} included Leading courageously, leading by example, and promoting a culture of trust ($PNI_{\text{modified}} = 0.332$, $PNI_{\text{modified}} = 0.335$, $PNI_{\text{modified}} = 0.335$, respectively).

In the data set of curriculum development and the technological factor, the midrange value is calculated as follows:

Dimensions:

$$\text{Midrange} = PNI_{\text{modified}} [(0.353 + 0.338)/2 = 0.345]$$

High group: PNI_{modified} was in range of 0.346-0.353 = Threat

Low group: PNI_{modified} was in range of 0.338-0.345 = Opportunity

Subdimensions:

$$\text{Midrange} = PNI_{\text{modified}} [(0.374 + 0.327)/2 = 0.350]$$

High group: PNI_{modified} was in range of 0.351-0.374 = Threat

Low group: PNI_{modified} was in range of 0.327-0.350 = Opportunity

Table 26

Current State, Desirable State, Priority Needs, and External Environmental Analysis Results of Academic Management Based on the Concept of Innovation Leadership Skills Regarding Curriculum Development Influenced by Technological Factors (n = 463)

Academic Management Based on the Concept of Innovation Leadership Skills: Curriculum Development	External Environment (Technological Factors)							High/ Low Group	SWOT Result
	Current State		Desirable State		Priority Needs		Rank		
	M	SD	M	SD	PNI _{Modified}				
Curriculum Development	3.17	0.841	4.27	0.841	0.345	2	High	T	
1. Innovation Vision and Strategy	3.12	0.818	4.22	0.844	0.353	1	High	T	
1.1 Realizing innovation vision	3.09	0.826	4.24	0.834	0.374	1	High	T	
1.2 Strategic thinking	3.15	0.831	4.23	0.840	0.342	10	Low	O	
1.3 Managing risk	3.12	0.797	4.20	0.859	0.345	9	Low	O	
2. Innovative Thinking	3.14	0.805	4.24	0.841	0.350	2	High	T	
2.1 Demonstrating curiosity	3.20	0.820	4.32	0.841	0.350	8	Low	O	
2.2 Developing Empathy for others	3.15	0.837	4.26	0.851	0.351	6	High	T	
2.3 Opportunity exploration	3.08	0.784	4.22	0.850	0.369	2	High	T	
2.4 Assaulting assumptions	3.04	0.803	4.11	0.932	0.353	5	High	T	
2.5 Proactive thinking	3.14	0.795	4.25	0.820	0.354*	4	High	T	
2.6 Idea generation	3.18	0.798	4.25	0.808	0.338	12	Low	O	
2.7 Idea championing	3.19	0.800	4.26	0.824	0.338	12	Low	O	
2.8 Idea application	3.15	0.801	4.26	0.802	0.351	6	High	T	
3. Innovation Recognition and Support	3.20	0.815	4.28	0.795	0.338	3	Low	O	
3.1 Leading courageously	3.20	0.818	4.29	0.775	0.339	11	Low	O	
3.2 Leading by example	3.21	0.831	4.28	0.794	0.333	14	Low	O	
3.3 Promoting a culture of trust	3.22	0.807	4.27	0.810	0.327	15	Low	O	
3.4 Recognizing the innovators	3.15	0.804	4.26	0.800	0.354*	3	High	T	

Note. O = Opportunity, T = Threat. *PNI_{modified} of Proactive thinking = 0.3535, PNI_{modified} Of

Recognizing the innovators = 03539.

Table 26 shows that the technological factor was the threat for curriculum development (PNI_{modified} = 0.345). For the technological factor, dimension of innovation vision and strategy was the threat (PNI_{modified} = 0.353), while innovation

recognition and support and innovative thinking were the opportunities ($PNI_{\text{modified}} = 0.338$, $PNI_{\text{modified}} = 0.350$, respectively). Top three subdimensions with high PNI_{modified} included realizing innovation vision, opportunity exploration and recognizing the innovators ($PNI_{\text{modified}} = 0.374$, $PNI_{\text{modified}} = 0.369$, $PNI_{\text{modified}} = 0.354$, respectively). Top three subdimensions with low PNI_{modified} included Promoting a culture of trust, leading by example, idea generation, and idea championing ($PNI_{\text{modified}} = 0.327$, $PNI_{\text{modified}} = 0.333$, $PNI_{\text{modified}} = 0.338$, $PNI_{\text{modified}} = 0.338$, respectively).

In the data set of teaching and learning influenced by the political-legal factor, the midrange value is calculated as follows:

Dimensions:

$$\text{Midrange} = PNI_{\text{modified}} [(0.355 + 0.323)/2 = 0.339]$$

High group: PNI_{modified} was in range of 0.340-0.355 = Threat

Low group: PNI_{modified} was in range of 0.323-0.339 = Opportunity

Subdimensions:

$$\text{Midrange} = PNI_{\text{modified}} [(0.363 + 0.314)/2 = 0.338]$$

High group: PNI_{modified} was in range of 0.339-0.363 = Threat

Low group: PNI_{modified} was in range of 0.314-0.338 = Opportunity

Table 27

*Current State, Desirable State, Priority Needs, and External Environmental Analysis Results of Academic Management Based on the Concept of Innovation Leadership Skills Regarding **Teaching and Learning** Influenced by **Political-Legal Factors** (n = 463)*

Academic Management Based on the Concept of Innovation Leadership Skills: Teaching and Learning	External Environment (Political-Legal Factors)							High/ Low Group	SWOT Result
	Current State		Desirable State		Priority Needs		Rank		
	M	SD	M	SD	PNI _{Modified}				
Teaching and Learning	3.18	0.799	4.25	0.833	0.333	4	Low	O	
1. Innovation Vision and Strategy	3.09	0.788	4.18	0.856	0.355	1	High	T	
1.1 Realizing innovation vision	3.07	0.788	4.19	0.845	0.363	1	High	T	
1.2 Strategic thinking	3.12	0.783	4.23	0.809	0.356	2	High	T	
1.3 Managing risk	3.06	0.792	4.13	0.913	0.346	3	High	T	
2. Innovative Thinking	3.19	0.793	4.24	0.834	0.330	2	Low	O	
2.1 Demonstrating curiosity	3.24	0.776	4.31	0.802	0.330	8	Low	O	
2.2 Developing empathy for others	3.13	0.770	4.21	0.843	0.344	4	High	T	
2.3 Opportunity exploration	3.22	0.794	4.27	0.805	0.327	11	Low	O	
2.4 Assaulting assumptions	3.04	0.787	4.04	0.988	0.328	10	Low	O	
2.5 Proactive thinking	3.21	0.778	4.28	0.785	0.331*	7	Low	O	
2.6 Idea generation	3.22	0.817	4.28	0.821	0.331*	6	Low	O	
2.7 Idea championing	3.25	0.795	4.27	0.820	0.314	15	Low	O	
2.8 Idea application	3.21	0.827	4.29	0.810	0.335	5	Low	O	
3. Innovation Recognition and Support	3.25	0.819	4.30	0.815	0.323	3	Low	O	
3.1 Leading courageously	3.28	0.828	4.32	0.801	0.318	14	Low	O	
3.2 Leading by example	3.26	0.832	4.32	0.809	0.323*	12	Low	O	
3.3 Promoting a culture of trust	3.27	0.818	4.32	0.799	0.323*	13	Low	O	
3.4 Recognizing the innovators	3.19	0.799	4.24	0.850	0.329	9	Low	O	

Note. O = Opportunity, T = Threat. *PNI_{modified} of Proactive thinking = 0.3306, PNI_{modified} of Idea

generation = 0.3311. *PNI_{modified} of Leading by example = 0.3230, PNI_{modified} of Promoting a culture of trust = 0.3225.

Table 27 shows that the political-legal factor was the opportunity for curriculum development (PNI_{modified} = 0.333). For the political-legal factor, dimension of innovation vision and strategy was the threat (PNI_{modified} = 0.355), while innovation

recognition and support and innovative thinking were the opportunities ($PNI_{\text{modified}} = 0.323$, $PNI_{\text{modified}} = 0.330$, respectively). All components of the innovation vision and strategy were the top three subdimensions with high PNI_{modified} , including realizing innovation vision, strategic thinking, and managing risk ($PNI_{\text{modified}} = 0.363$, $PNI_{\text{modified}} = 0.356$, $PNI_{\text{modified}} = 0.346$, respectively). Top three subdimensions with low PNI_{modified} included idea championing, leading courageously, and Promoting a culture of trust ($PNI_{\text{modified}} = 0.314$, $PNI_{\text{modified}} = 0.318$, $PNI_{\text{modified}} = 0.323$, respectively).

In the data set of teaching and learning influenced by the economic factor, the midrange value is calculated as follows:

Dimensions:

$$\text{Midrange} = PNI_{\text{modified}} [(0.356 + 0.346)/2 = 0.351]$$

High group: PNI_{modified} was in range of 0.352-0.356 = Threat

Low group: PNI_{modified} was in range of 0.346-0.351 = Opportunity

Subdimensions:

$$\text{Midrange} = PNI_{\text{modified}} [(0.375 + 0.321)/2 = 0.348]$$

High group: PNI_{modified} was in range of 0.349-0.375 = Threat

Low group: PNI_{modified} was in range of 0.321-0.348 = Opportunity

Table 28

*Current State, Desirable State, Priority Needs, and External Environmental Analysis
Results of Academic Management Based on the Concept of Innovation Leadership
Skills Regarding Teaching and Learning Influenced by Economic Factors (n = 463)*

Academic Management Based on the Concept of Innovation Leadership Skills: Teaching and Learning	External Environment (Economic Factors)							SWOT Result
	Current State		Desirable State		Priority Needs		High/ Low Group	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>PNI_{modified}</i>	Rank		
Teaching and Learning	3.19	0.819	4.30	0.812	0.349	3	High	T
1. Innovation Vision and Strategy	3.15	0.823	4.28	0.829	0.356	1	High	T
1.1 Realizing innovation vision	3.15	0.827	4.28	0.820	0.359*	2	High	T
1.2 Strategic thinking	3.18	0.805	4.30	0.794	0.351	7	High	T
1.3 Managing risk	3.13	0.837	4.25	0.872	0.357	4	High	T
2. Innovative Thinking	3.18	0.814	4.28	0.819	0.349	2	Low	O
2.1 Demonstrating curiosity	3.29	0.838	4.34	0.803	0.321	15	Low	O
2.2 Developing empathy for others	3.09	0.788	4.25	0.816	0.375	1	High	T
2.3 Opportunity exploration	3.17	0.819	4.27	0.816	0.347	11	Low	O
2.4 Assaulting assumptions	3.05	0.849	4.13	0.977	0.352	5	High	T
2.5 Proactive thinking	3.20	0.827	4.31	0.802	0.348	9	High	T
2.6 Idea generation	3.21	0.808	4.32	0.785	0.348	9	High	T
2.7 Idea championing	3.21	0.786	4.33	0.782	0.351	7	High	T
2.8 Idea application	3.20	0.795	4.33	0.775	0.352	5	High	T
3. Innovation Recognition and Support	3.23	0.828	4.34	0.786	0.346	3	Low	O
3.1 Leading courageously	3.24	0.821	4.37	0.769	0.346	12	Low	O
3.2 Leading by example	3.25	0.843	4.37	0.767	0.345	13	Low	O
3.3 Promoting a culture of trust	3.26	0.835	4.35	0.807	0.334	14	Low	O
3.4 Recognizing the innovators	3.16	0.812	4.29	0.802	0.359*	3	High	T

Note. O = Opportunity, T = Threat. * $PNI_{modified}$ of Realizing innovation vision = 0.3590, $PNI_{modified}$ of

Promoting a culture of trust = 0.3587.

Table 28 shows that the economic factor was the threat for teaching and learning ($PNI_{modified} = 0.349$). For the economic factor, dimension of innovation vision and strategy was the threat ($PNI_{modified} = 0.356$), while innovation recognition and support and innovative thinking were the opportunities ($PNI_{modified} = 0.375$, $PNI_{modified}$

= 0.349, respectively). Top three subdimensions with high PNI_{modified} included developing empathy for others, realizing innovation vision, and recognizing the innovators ($PNI_{\text{modified}} = 0.363$, $PNI_{\text{modified}} = 0.359$, $PNI_{\text{modified}} = 0.359$, respectively). Top three subdimensions with low PNI_{modified} included demonstrating curiosity, promoting a culture of trust, and leading by example ($PNI_{\text{modified}} = 0.321$, $PNI_{\text{modified}} = 0.334$, $PNI_{\text{modified}} = 0.345$, respectively).

In the data set of teaching and learning influenced by the sociocultural factor, the midrange value is calculated as follows:

Dimensions:

$$\text{Midrange} = PNI_{\text{modified}} [(0.367 + 0.340)/2 = 0.353]$$

High group: PNI_{modified} was in range of 0.354-0.367 = Threat

Low group: PNI_{modified} was in range of 0.340-0.353 = Opportunity

Subdimensions:

$$\text{Midrange} = PNI_{\text{modified}} [(0.371 + 0.336)/2 = 0.353]$$

High group: PNI_{modified} was in range of 0.354-0.371 = Threat

Low group: PNI_{modified} was in range of 0.336-0.353 = Opportunity

Table 29

*Current State, Desirable State, Priority Needs, and External Environmental Analysis
Results of Academic Management Based on the Concept of Innovation Leadership
Skills Regarding Teaching and Learning Influenced by Sociocultural Factors (n =
463)*

Academic Management Based on the Concept of Innovation Leadership Skills: Teaching and Learning	External Environment (Sociocultural Factors)							
	Current State		Desirable State		Priority Needs		High/ Low Group	SWOT Result
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>PNI_{Modified}</i>	Rank		
Teaching and Learning	3.16	0.821	4.26	0.827	0.350	2	High	T
1. Innovation Vision and Strategy	3.09	0.823	4.22	0.838	0.367	1	High	T
1.1 Realizing innovation vision	3.09	0.824	4.24	0.816	0.371	1	High	T
1.2 Strategic thinking	3.11	0.831	4.24	0.812	0.361	3	High	T
1.3 Managing risk	3.06	0.815	4.19	0.887	0.368	2	High	T
2. Innovative Thinking	3.15	0.820	4.26	0.830	0.349	2	Low	O
2.1 Demonstrating curiosity	3.21	0.822	4.30	0.797	0.341	11	Low	O
2.2 Developing Empathy for others	3.14	0.804	4.23	0.825	0.347	8	Low	O
2.3 Opportunity exploration	3.16	0.843	4.27	0.842	0.351	6	Low	O
2.4 Assaulting assumptions	3.04	0.821	4.10	0.932	0.348	7	Low	O
2.5 Proactive thinking	3.15	0.843	4.29	0.818	0.360	5	High	T
2.6 Idea generation	3.20	0.794	4.28	0.812	0.338*	13	Low	O
2.7 Idea championing	3.19	0.817	4.29	0.806	0.345	10	Low	O
2.8 Idea application	3.15	0.815	4.29	0.812	0.361	3	High	T
3. Innovation Recognition and Support	3.21	0.822	4.30	0.813	0.340	3	Low	O
3.1 Leading courageously	3.22	0.816	4.30	0.811	0.336	15	Low	O
3.2 Leading by example	3.24	0.832	4.33	0.790	0.338*	14	Low	O
3.3 Promoting a culture of trust	3.21	0.812	4.30	0.818	0.339	12	Low	O
3.4 Recognizing the innovators	3.17	0.827	4.26	0.835	0.347	8	Low	O

Note. O = Opportunity, T = Threat. * PNI_{modified} of Idea generation = 0.3378, PNI_{modified} Of Leading by example = 0.3376.

Table 29 shows that the sociocultural factor was the threat for teaching and learning ($PNI_{\text{modified}} = 0.350$). For the sociocultural factor, dimension of innovation vision and strategy was the threat ($PNI_{\text{modified}} = 0.367$), while innovation recognition

and support and innovative thinking were the opportunities ($PNI_{\text{modified}} = 0.340$, $PNI_{\text{modified}} = 0.349$, respectively). All components of the innovation vision and strategy dimension were the top three subdimensions with high PNI_{modified} including realizing innovation vision, managing risk, and strategic thinking, ($PNI_{\text{modified}} = 0.371$, $PNI_{\text{modified}} = 0.368$, $PNI_{\text{modified}} = 0.361$, respectively). Top three subdimensions with low PNI_{modified} included leading courageously, leading by example, and idea generation ($PNI_{\text{modified}} = 0.336$, $PNI_{\text{modified}} = 0.338$, $PNI_{\text{modified}} = 0.338$, respectively).

In the data set of teaching and learning influenced by the technological factor, the midrange value is calculated as follows:

Dimensions:

$$\text{Midrange} = PNI_{\text{modified}} [(0.356 + 0.344)/2 = 0.350]$$

High group: PNI_{modified} was in range of 0.351-0.356 = Threat

Low group: PNI_{modified} was in range of 0.344-0.350 = Opportunity

Subdimensions:

$$\text{Midrange} = PNI_{\text{modified}} [(0.376 + 0.331)/2 = 0.353]$$

High group: PNI_{modified} was in range of 0.354-0.376 = Threat

Low group: PNI_{modified} was in range of 0.331-0.353 = Opportunity

Table 30

*Current State, Desirable State, Priority Needs, and External Environmental Analysis Results of Academic Management Based on the Concept of Innovation Leadership Skills Regarding **Teaching and Learning** Influenced by **Technological Factors** (n = 463)*

Academic Management Based on the Concept of Innovation Leadership Skills: Teaching and Learning	External Environment (Technological Factors)							High/ Low Group	SWOT Result
	Current State		Desirable State		Priority Needs				
	M	SD	M	SD	PNI _{Modified}	Rank			
Teaching and Learning	3.16	0.842	4.28	0.833	0.351	1	High	T	
1. Innovation Vision and Strategy	3.13	0.854	4.25	0.857	0.356	1	High	T	
1.1 Realizing innovation vision	3.13	0.852	4.26	0.841	0.358	4	High	T	
1.2 Strategic thinking	3.14	0.847	4.27	0.832	0.359	3	High	T	
1.3 Managing risk	3.12	0.863	4.21	0.897	0.350	8	Low	O	
2. Innovative Thinking	3.16	0.838	4.28	0.833	0.353	2	High	T	
2.1 Demonstrating curiosity	3.23	0.823	4.32	0.827	0.337	14	Low	O	
2.2 Developing empathy for others	3.09	0.797	4.25	0.814	0.376	1	High	T	
2.3 Opportunity exploration	3.16	0.845	4.32	0.795	0.365	2	High	T	
2.4 Assaulting assumptions	3.03	0.875	4.10	1.005	0.350	8	Low	O	
2.5 Proactive thinking	3.16	0.845	4.29	0.832	0.357	5	High	T	
2.6 Idea generation	3.21	0.850	4.31	0.797	0.345	11	Low	O	
2.7 Idea championing	3.22	0.829	4.31	4.32	0.339	13	Low	O	
2.8 Idea application	3.18	0.837	0.808	0.784	0.355*	6	High	T	
3. Innovation Recognition and Support	3.19	0.844	4.29	0.815	0.344	3	Low	O	
3.1 Leading courageously	3.22	0.857	4.33	0.795	0.344	12	Low	O	
3.2 Leading by example	3.21	0.842	4.28	0.825	0.331	15	Low	O	
3.3 Promoting a culture of trust	3.19	0.842	4.30	0.805	0.348	10	Low	O	
3.4 Recognizing the innovators	3.16	0.833	4.27	0.835	0.355*	7	High	T	

Note. O = Opportunity, T = Threat. *PNI_{modified} of Idea application = 0.3555, PNI_{modified} of Recognizing the innovators = 0.3546.

Table 30 shows that the technological factor was the threat for teaching and learning (PNI_{modified} = 0.351). For the technological factor, dimensions of innovation vision and strategy and innovative thinking were the threats (PNI_{modified} = 0.356,

$PNI_{\text{modified}} = 0.353$, respectively), while the dimension of innovation recognition and support was the opportunity ($PNI_{\text{modified}} = 0.344$). Top three subdimensions with high PNI_{modified} included developing empathy for others, opportunity exploration, and strategic thinking, ($PNI_{\text{modified}} = 0.376$, $PNI_{\text{modified}} = 0.365$, $PNI_{\text{modified}} = 0.359$, respectively). Top three subdimensions with low PNI_{modified} included leading by example, demonstrating curiosity, and idea championing ($PNI_{\text{modified}} = 0.331$, $PNI_{\text{modified}} = 0.337$, $PNI_{\text{modified}} = 0.339$, respectively).

In the data set of measurement and evaluation influenced by the political-legal factor, the midrange value is calculated as follows:

Dimensions:

$$\text{Midrange} = PNI_{\text{modified}} [(0.348 + 0.329)/2 = 0.338]$$

High group: PNI_{modified} was in range of 0.339-0.348 = Threat

Low group: PNI_{modified} was in range of 0.329-0.338 = Opportunity

Subdimensions:

$$\text{Midrange} = PNI_{\text{modified}} [(0.358 + 0.317)/2 = 0.337]$$

High group: PNI_{modified} was in range of 0.338-0.358 = Threat

Low group: PNI_{modified} was in range of 0.317-0.337 = Opportunity

Table 31

*Current State, Desirable State, Priority Needs, and External Environmental Analysis
Results of Academic Management Based on the Concept of Innovation Leadership
Skills Regarding Measurement and Evaluation Influenced by Political-Legal Factors
(n = 463)*

Academic Management Based on the Concept of Innovation Leadership Skills: Measurement and Evaluation	External Environment (Political-Legal Factors)							High/ Low Group	SWOT Result
	Current State		Desirable State		Priority Needs				
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	$PNI_{Modified}$	Rank			
Measurement and Evaluation	3.18	0.813	4.25	0.845	0.338	4	Low	O	
1. Innovation Vision and Strategy	3.09	0.806	4.16	0.873	0.348	1	High	T	
1.1 Realizing innovation vision	3.07	0.815	4.17	0.858	0.358	1	High	T	
1.2 Strategic thinking	3.11	0.790	4.17	0.836	0.343	6	High	T	
1.3 Managing risk	3.09	0.812	4.15	0.923	0.344	5	High	T	
2. Innovative Thinking	3.17	0.811	4.25	0.848	0.338	2	Low	O	
2.1 Demonstrating curiosity	3.24	0.817	4.31	0.832	0.331	12	Low	O	
2.2 Developing empathy for others	3.12	0.782	4.21	0.849	0.350	2	High	T	
2.3 Opportunity exploration	3.15	0.801	4.24	0.829	0.348*	3	High	T	
2.4 Assaulting assumptions	3.07	0.823	4.09	0.962	0.333	9	Low	O	
2.5 Proactive thinking	3.21	0.807	4.29	0.834	0.337	8	Low	O	
2.6 Idea generation	3.22	0.804	4.29	0.823	0.333*	10	Low	O	
2.7 Idea championing	3.22	0.801	4.27	0.831	0.327	13	Low	O	
2.8 Idea application	3.18	0.849	4.29	0.825	0.348*	4	High	T	
3. Innovation Recognition and Support	3.24	0.824	4.31	0.819	0.329	3	Low	O	
3.1 Leading courageously	3.27	0.847	4.31	0.812	0.317	15	Low	O	
3.2 Leading by example	3.28	0.827	4.35	0.819	0.326	14	Low	O	
3.3 Promoting a culture of trust	3.24	0.830	4.32	0.815	0.333*	9	Low	O	
3.4 Recognizing the innovators	3.18	0.793	4.26	0.831	0.339	7	High	T	

Note. O = Opportunity, T = Threat. * $PNI_{modified}$ of Idea generation = 0.3331, $PNI_{modified}$ of Promoting a culture of trust = 0.3333. * $PNI_{modified}$ of Opportunity exploration = 0.3477, $PNI_{modified}$ of Idea application = 0.3476.

Table 31 shows that the political-legal factor was the opportunity for measurement and evaluation ($PNI_{modified} = 0.338$). For the political-legal factor, the

dimension of innovation vision and strategy was the threat ($PNI_{\text{modified}} = 0.348$), while dimensions of innovation recognition and support and innovative thinking were the opportunities ($PNI_{\text{modified}} = 0.338$, $PNI_{\text{modified}} = 0.329$). Top three subdimensions with high PNI_{modified} included realizing innovation vision, developing empathy for others, and opportunity exploration ($PNI_{\text{modified}} = 0.358$, $PNI_{\text{modified}} = 0.350$, $PNI_{\text{modified}} = 0.348$, respectively). Top three subdimensions with low PNI_{modified} included leading courageously, leading by example, and idea championing ($PNI_{\text{modified}} = 0.317$, $PNI_{\text{modified}} = 0.326$, $PNI_{\text{modified}} = 0.327$, respectively).

In the data set of measurement and evaluation influenced by the economic factor, the midrange value is calculated as follows:

Dimensions:

$$\text{Midrange} = PNI_{\text{modified}} [(0.371 + 0.332)/2 = 0.351]$$

High group: PNI_{modified} was in range of 0.352-0.371 = Threat

Low group: PNI_{modified} was in range of 0.332-0.351 = Opportunity

Subdimensions:

$$\text{Midrange} = PNI_{\text{modified}} [(0.375 + 0.323)/2 = 0.349]$$

High group: PNI_{modified} was in range of 0.350-0.375 = Threat

Low group: PNI_{modified} was in range of 0.323-0.349 = Opportunity

Table 32

Current State, Desirable State, Priority Needs, and External Environmental Analysis Results of Academic Management Based on the Concept of Innovation Leadership Skills Regarding Measurement and Evaluation Influenced by Economic Factors (n = 463)

Academic Management Based on the Concept of Innovation Leadership Skills: Measurement and Evaluation	External Environment (Economic Factors)							SWOT Result
	Current State		Desirable State		Priority Needs		High/ Low Group	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>PNI_{Modified}</i>	Rank		
Measurement and Evaluation	3.15	0.838	4.24	0.845	0.344	2	High	T
1. Innovation Vision and Strategy	3.06	0.823	4.20	0.867	0.371	1	High	T
1.1 Realizing innovation vision	3.06	0.793	4.20	0.846	0.375	1	High	T
1.2 Strategic thinking	3.09	0.836	4.23	0.849	0.369	3	High	T
1.3 Managing risk	3.04	0.839	4.17	0.906	0.370	2	High	T
2. Innovative Thinking	3.16	0.836	4.23	0.850	0.339	2	Low	O
2.1 Demonstrating curiosity	3.22	0.812	4.29	0.844	0.330*	13	Low	O
2.2 Developing empathy for others	3.13	0.818	4.22	0.845	0.350	5	High	T
2.3 Opportunity exploration	3.15	0.835	4.26	0.823	0.351	4	High	T
2.4 Assaulting assumptions	3.04	0.874	4.03	0.997	0.323	15	Low	O
2.5 Proactive thinking	3.16	0.839	4.23	0.825	0.337	9	Low	O
2.6 Idea generation	3.19	0.840	4.27	0.838	0.342	7	Low	O
2.7 Idea championing	3.19	0.851	4.28	0.818	0.343	6	Low	O
2.8 Idea application	3.19	0.819	4.27	0.813	0.340	8	Low	O
3. Innovation Recognition and Support	3.21	0.854	4.28	0.818	0.332	3	Low	O
3.1 Leading courageously	3.22	0.854	4.30	0.810	0.334	11	Low	O
3.2 Leading by example	3.24	0.850	4.31	0.790	0.330*	12	Low	O
3.3 Promoting a culture of trust	3.22	0.852	4.28	0.839	0.329	14	Low	O
3.4 Recognizing the innovators	3.17	0.861	4.24	0.831	0.335	10	Low	O

Note. O = Opportunity, T = Threat. **PNI_{modified}* of Demonstrating curiosity = 0.3295, *PNI_{modified}* of

Leading by example = 0.3302.

Table 32 shows that the economic factor was the threat for measurement and evaluation (*PNI_{modified}* = 0.344). For the economic factor, the dimension of innovation vision and strategy was the threat (*PNI_{modified}* = 0.371), while dimensions of

innovation recognition and support and innovative thinking were the opportunities ($PNI_{\text{modified}} = 0.339$, $PNI_{\text{modified}} = 0.332$). All components of the innovation vision and strategy dimension were the top three subdimensions with high PNI_{modified} including realizing innovation vision, managing risk, and strategic thinking ($PNI_{\text{modified}} = 0.375$, $PNI_{\text{modified}} = 0.370$, $PNI_{\text{modified}} = 0.369$, respectively). Top three subdimensions with low PNI_{modified} included assaulting assumptions, promoting a culture of trust, and idea championing ($PNI_{\text{modified}} = 0.323$, $PNI_{\text{modified}} = 0.329$, $PNI_{\text{modified}} = 0.330$, respectively).

In the data set of measurement and evaluation influenced by the sociocultural factor, the midrange value is calculated as follows:

Dimensions:

$$\text{Midrange} = PNI_{\text{modified}} [(0.353 + 0.338)/2 = 0.345]$$

High group: PNI_{modified} was in range of 0.346-0.353 = Threat

Low group: PNI_{modified} was in range of 0.338-0.345 = Opportunity

Subdimensions:

$$\text{Midrange} = PNI_{\text{modified}} [(0.374 + 0.327)/2 = 0.350]$$

High group: PNI_{modified} was in range of 0.351-0.374 = Threat

Low group: PNI_{modified} was in range of 0.327-0.350 = Opportunity

Table 33

*Current State, Desirable State, Priority Needs, and External Environmental Analysis
Results of Academic Management Based on the Concept of Innovation Leadership
Skills Regarding Measurement and Evaluation Influenced by Sociocultural Factors
(n = 463)*

Academic Management Based on the Concept of Innovation Leadership Skills: Measurement and Evaluation	External Environment (Sociocultural Factors)							
	Current State		Desirable State		Priority Needs		High/ Low Group	SWOT Result
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>PNI_{Modified}</i>	Rank		
Measurement and Evaluation	3.15	0.810	4.25	0.829	0.348	1	High	T
1. Innovation Vision and Strategy	3.12	0.818	4.22	0.844	0.353	1	High	T
1.1 Realizing innovation vision	3.09	0.826	4.24	0.834	0.374	1	High	T
1.2 Strategic thinking	3.15	0.831	4.23	0.840	0.342	10	Low	O
1.3 Managing risk	3.12	0.797	4.20	0.859	0.345	9	Low	O
2. Innovative Thinking	3.14	0.805	4.24	0.841	0.350	2	High	T
2.1 Demonstrating curiosity	3.20	0.820	4.32	0.841	0.350	8	Low	O
2.2 Developing empathy for others	3.15	0.837	4.26	0.851	0.351*	6	High	T
2.3 Opportunity exploration	3.08	0.784	4.22	0.850	0.369	2	High	T
2.4 Assaulting assumptions	3.04	0.803	4.11	0.932	0.353	5	High	T
2.5 Proactive thinking	3.14	0.795	4.25	0.820	0.354*	4	High	T
2.6 Idea generation	3.18	0.798	4.25	0.808	0.338	12	Low	O
2.7 Idea championing	3.19	0.800	4.26	0.824	0.338	12	Low	O
2.8 Idea application	3.15	0.801	4.26	0.802	0.351*	7	High	T
3. Innovation Recognition and Support	3.20	0.815	4.28	0.795	0.338	3	Low	O
3.1 Leading courageously	3.20	0.818	4.29	0.775	0.339	11	Low	O
3.2 Leading by example	3.21	0.831	4.28	0.794	0.333	14	Low	O
3.3 Promoting a culture of trust	3.22	0.807	4.27	0.810	0.327	15	Low	O
3.4 Recognizing the innovators	3.15	0.804	4.26	0.800	0.354*	3	High	T

Note. O = Opportunity, T = Threat. * PNI_{modified} of Developing empathy for others = 0.3509, PNI_{modified} of Idea application = 0.3507. * PNI_{modified} of Recognizing the innovators = 0.3535, PNI_{modified} of Proactive thinking = 0.3539.

Table 33 shows that the sociocultural factor was the threat for measurement and evaluation ($PNI_{\text{modified}} = 0.348$). For the sociocultural factor, dimensions of

innovation vision and strategy and innovative thinking were the threats ($PNI_{\text{modified}} = 0.353$, $PNI_{\text{modified}} = 0.350$), while the dimension of innovation recognition and support was the opportunity ($PNI_{\text{modified}} = 0.338$). Top three subdimensions with high PNI_{modified} included realizing innovation vision, opportunity exploration, and recognizing the innovators ($PNI_{\text{modified}} = 0.374$, $PNI_{\text{modified}} = 0.369$, $PNI_{\text{modified}} = 0.354$, respectively). Top three subdimensions with low PNI_{modified} included promoting a culture of trust, leading by example, idea generation, and idea championing ($PNI_{\text{modified}} = 0.327$, $PNI_{\text{modified}} = 0.333$, $PNI_{\text{modified}} = 0.338$, $PNI_{\text{modified}} = 0.338$, respectively).

In the data set of measurement and evaluation influenced by the technological factor, the midrange value is calculated as follows:

Dimensions:

$$\text{Midrange} = PNI_{\text{modified}} [(0.350 + 0.336)/2 = 0.343]$$

High group: PNI_{modified} was in range of 0.344-0.350 = Threat

Low group: PNI_{modified} was in range of 0.336-0.343 = Opportunity

Subdimensions:

$$\text{Midrange} = PNI_{\text{modified}} [(0.362 + 0.328)/2 = 0.345]$$

High group: PNI_{modified} was in range of 0.346-0.362 = Threat

Low group: PNI_{modified} was in range of 0.328-0.345 = Opportunity

Table 34

*Current State, Desirable State, Priority Needs, and External Environmental Analysis
Results of Academic Management Based on the Concept of Innovation Leadership
Skills Regarding Measurement and Evaluation Influenced by Technological Factors
(n = 463)*

Academic Management Based on the Concept of Innovation Leadership Skills: Measurement and Evaluation	External Environment (Technological Factors)							SWOT Result
	Current State		Desirable State		Priority Needs		High/ Low Group	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>PNI_{Modified}</i>	Rank		
Measurement and Evaluation	3.18	0.825	4.27	0.809	0.343	3	High	T
1. Innovation Vision and Strategy	3.15	0.812	4.25	0.820	0.350	1	High	T
1.1 Realizing innovation vision	3.14	0.818	4.25	0.806	0.356	2	High	T
1.2 Strategic thinking	3.17	0.805	4.27	0.805	0.347*	5	High	T
1.3 Managing risk	3.13	0.814	4.22	0.849	0.348	4	High	T
2. Innovative Thinking	3.18	0.822	4.27	0.807	0.344	2	High	T
2.1 Demonstrating curiosity	3.21	0.825	4.30	0.789	0.341*	9	Low	O
2.2 Developing empathy for others	3.14	0.812	4.27	0.778	0.362	1	High	T
2.3 Opportunity exploration	3.15	0.818	4.26	0.784	0.353	3	High	T
2.4 Assaulting assumptions	3.08	0.834	4.13	0.931	0.340	11	Low	O
2.5 Proactive thinking	3.20	0.834	4.25	0.792	0.330*	13	Low	O
2.6 Idea generation	3.22	0.814	4.32	0.787	0.343	7	Low	O
2.7 Idea championing	3.23	0.828	4.31	0.818	0.333	12	Low	O
2.8 Idea application	3.20	0.811	4.31	0.774	0.347*	6	High	T
3. Innovation Recognition and Support	3.21	0.841	4.28	0.805	0.336	3	Low	O
3.1 Leading courageously	3.22	0.830	4.29	0.818	0.330*	13	Low	O
3.2 Leading by example	3.22	0.833	4.31	0.770	0.341*	10	Low	O
3.3 Promoting a culture of trust	3.22	0.858	4.27	0.811	0.328	15	Low	O
3.4 Recognizing the innovators	3.17	0.841	4.25	0.821	0.342	8	Low	O

Note. O = Opportunity, T = Threat. * $PNI_{modified}$ of Strategic thinking = 0.3474, $PNI_{modified}$ of Idea application = 0.3471. * $PNI_{modified}$ of Demonstrating curiosity = 0.3414, $PNI_{modified}$ of Leading by example = 0.3412.

Table 34 shows that the technological factor was the threat for measurement and evaluation ($PNI_{modified} = 0.343$). For the technological factor, dimensions of innovation vision and strategy and innovative thinking were the threats ($PNI_{modified} =$

0.350; $PNI_{\text{modified}} = 0.344$, respectively), while the dimension of innovation recognition and support was the opportunity ($PNI_{\text{modified}} = 0.336$). Top three subdimensions with high PNI_{modified} included developing empathy for others, realizing innovation vision, and opportunity exploration ($PNI_{\text{modified}} = 0.362$; $PNI_{\text{modified}} = 0.356$; $PNI_{\text{modified}} = 0.353$, respectively). Top three subdimensions with low PNI_{modified} included promoting a culture of trust, proactive thinking, and leading courageously ($PNI_{\text{modified}} = 0.328$; $PNI_{\text{modified}} = 0.330$; $PNI_{\text{modified}} = 0.330$, respectively).

Comments and recommendations of the respondents were shown in Table 33.

Table 35

Comments and Recommendations on Academic Management Based on the Concept of Innovation Leadership Skills

Academic Management	Comments and Recommendations
1. Curriculum Development	<p>Monitoring Curriculum Implementation (f=12)</p> <ul style="list-style-type: none"> -The Ministry should monitor the implementation of the curriculum. -Students are encouraged to participate in the implementation of the curriculum, including the school and the management team. -The Ministry must have officials to monitor the shortages of the curriculum in person, including helping provide a variety of materials. -Have a clear and standardized plan for implementing your curriculum. -Teachers need to follow the curriculum, keep up with the curriculum. -All unit leaders according to hierarchies, students, and teachers who are involved in effective implementation will be aware of the challenges that need to be addressed. -The Minister of Education and the Government must properly monitor and evaluate any past implementation. -Curriculum Implementation Monitoring (School directors) -Curriculum Implementation Monitoring and revisions (teachers) -Effective implementation -Strengthening the curriculum for the better -School directors and teachers prepare and implement properly. <p>Active Participation from Stakeholder (f=8)</p>

Academic Management	Comments and Recommendations
	<p>-Must have participation from communities, parents, teachers, and students themselves.</p> <p>-Parental Involvement</p> <p>-Stakeholder participation</p> <p>-Need the participation of all students and teachers in the school.</p> <p>-Must have the participation of the government (relevant ministries and institutions), other organizations, teachers.</p> <p>-Student participation</p> <p>-Establishing cooperation with organizations or development partners on the operational system and good communication.</p> <p>-Active participation from stakeholders.</p> <p>Training and Development (f=7)</p> <p>-Provide adequate training for teachers in charge, technical teachers, and school directors in accordance with the context of the science or social curriculum.</p> <p>-Training about innovations for school administrators and teachers.</p> <p>-Must cultivate love in the heart and have a long-term vision to cultivate and create leaders.</p> <p>-The teacher must be trained by specialists from the Ministry and apply with students.</p> <p>-Create training courses for teachers.</p> <p>-Increase workshops</p> <p>-Teachers strengthen and expand with additional technology.</p> <p>Curriculum and Textbook Review (f=6)</p> <p>-Leaders need to add and eliminate what is not beneficial to student learning in the curriculum related to the innovation leadership skills of the students.</p> <p>-Development according to the modern century to match the competition.</p> <p>-In particular, there should be a workshop program to exchange ideas between teachers in each specialty and submit ideas to both programmers to understand the challenges that have arisen and can be developed.</p> <p>-Curriculum must be made by the teacher in accordance with the policy of the Ministry / institution.</p> <p>-The MoEYS collect data and announce revisions.</p> <p>-The development of new textbooks.</p> <p>Instilling Innovation Leadership Skills in the curriculum (f=4)</p> <p>-Disseminate widely in the local, schools and society.</p> <p>-Promoting innovation leadership for seeing the possibility strategy on the curriculum.</p> <p>-Incorporate innovation leadership into the curriculum.</p> <p>-The MoEYS should take care to disseminate the innovation leadership skills widely to the educational institutions to understand the innovation leadership skills. In addition, they</p>

Academic Management	Comments and Recommendations
	<p>provide opportunities for teachers to help spread those skills to students.</p> <p>Good Education Policy (f=3)</p> <ul style="list-style-type: none"> -Rely on the establishment of the Ministry's good education policy -Develop appropriate policies -MoEYS and Government Policy <p>Effective Curriculum Development (f=2)</p> <ul style="list-style-type: none"> -Clear and proper curriculum design -Curriculum must be clear and detailed. <p>Purpose and Planning (f=2)</p> <ul style="list-style-type: none"> -There must be a number of specific objectives involved, as well as a plan through the theoretical network of past and present professional research and practice. -All stakeholders must be involved, especially the MoEYS must clearly define each plan. <p>Student Self-Learning (f=2)</p> <ul style="list-style-type: none"> -Student Self-Learning -Students must receive, research, and follow. <p>Increasing incentives and salaries (f=2)</p> <ul style="list-style-type: none"> -Having to give incentives to individuals according to individual's competency. -Increase salary of teachers <p>Others:</p> <ul style="list-style-type: none"> -The MoEYS, school directors, and teachers need to communicate with each other. -Give full autonomy to the school management -There must be a quality curriculum. -High qualified teacher -School directors who are highly committed -Especially to provide students with the opportunity to experience and participate in social work as much as possible to keep young people learning by themselves. -All teachers participate in creating something new. -Encourage school directors and teachers
<p>2. Teaching and Learning</p>	<p>Active Participation from Stakeholders (f=11)</p> <ul style="list-style-type: none"> -Active participation from students, parents, and teachers -Cooperation -Full participation from parents, students, and educators -School directors, teachers, students, parents, and the provincial department must pay attention to education because it is a backbone for national economic development. - Regular meeting with board of directors of the school, school support committee, or student guardians -Active participation from both parties [the teacher and students] through various strategies - Ministries, school directors, teachers, students, guardians, students and the community to know and understand the actual

Academic Management	Comments and Recommendations
	<p>daily activities of students, both at school, at home and everywhere</p> <ul style="list-style-type: none"> -School directors, teachers, and students, as well as parents, must encourage their children to come to schools. -School management, teachers, students, guardians, students, and the community must cooperate to improve the implementation, monitoring, and evaluation of teaching and learning to be more effective. -Stakeholders must actively participate in and implement the strategic plans set out by the MoEYS, departments and schools. -Strengthen the implementation of stakeholder roles and responsibilities <p>Teacher training (f=9)</p> <ul style="list-style-type: none"> -Let the relevant ministries, especially the ministries, assign teachers to study more to gain more understanding. -Teachers must have both hard and soft skills. -Skills of teachers. -Teachers increase their qualifications. -Teachers scientifically research and create new ideas. -It is the teachers who have participated in the training and have enough knowledge to train the students to get good quality human resources, which is the objective that we all want. -Increase seminars -Try to study and research <p>Student-Focused Teaching (f=7)</p> <ul style="list-style-type: none"> -Train them [students] to know how to set life goals and how to plan for achieving goals. Take actions as set in the plan continuously. -Give students more opportunities to participate in activities. -Encourage students to work hard and seek more knowledge to develop themselves and society. -Strengthen the training of soft skills for students -Encourage students to participate and provide rewards. -Focus on gaining students' knowledge and applying it in their daily lives. -Provincial departments encourage and help children to learn <p>Active participation of teachers and students (f=5)</p> <ul style="list-style-type: none"> -Factors include students, teachers -Teaching and learning require the participation of students and teachers so that students can participate in a variety of activities to develop students' abilities and strengthen their leadership now as well as in the future. -Teachers and students actively participate. -Teachers and students use their thinking and creativity to do better. -Need to cultivate the spirit of teachers and students <p>Instilling innovation leadership skills in students (f=4)</p>

Academic Management	Comments and Recommendations
	<p>-Teachers instill these skills [innovation leadership skills] in students.</p> <p>-School directors and teachers must do their best to disseminate to students a clear understanding of innovation leadership skills development.</p> <p>-School directors disseminate innovation leadership skills.</p> <p>-Disseminate widely</p> <p>Learning Resource Sufficiency (f=3)</p> <p>-Learning resources</p> <p>-Adequate learning materials</p> <p>-The school must be well-equipped.</p> <p>Internal Supervision on Teaching (f=3)</p> <p>-School directors need to integrate a high perspective in order to get implementation to work.</p> <p>-School management (directly and indirectly monitoring of implementation, seeking additional knowledge from outside to internal training)</p> <p>-School management and teachers must monitor and teach appropriately.</p> <p>Discipline Reinforcement (f=3)</p> <p>-Students have to listen to and follow teachers and parents.</p> <p>-Students follow teachers.</p> <p>-Discipline reinforcement</p> <p>-Leaders must be able to disseminate the principles, plans and management of teaching staff in a consistent and equitable manner to each teaching staff.</p> <p>-Manage transparently.</p> <p>-Tasks must be divided according to the skills of each individual based on the principles of justice and transparency. In short, corruption must be eliminated to the maximum.</p> <p>Good Governance (f=3)</p> <p>-Leaders must be able to disseminate the principles, plans and management of teaching staff in a consistent and equitable manner to each teaching staff.</p> <p>-Manage transparently.</p> <p>-Tasks must be divided according to the skills of each individual based on the principles of justice and transparency. In short, corruption must be eliminated to the maximum.</p> <p>Teachers as a Key Implementer (f=3)</p> <p>-teachers (reviewing implementation and editing and recording key points to share)</p> <p>-Teachers help explain pathways of learning and knowledge.</p> <p>-Teachers play a key role in implementing this work.</p> <p>Quality Focus (f=2)</p> <p>-quality of learning</p> <p>-Need to restrict the quality of students' education.</p> <p>Parental Involvement (f=2)</p> <p>-Parents and guardians have to listen to information</p>

Academic Management	Comments and Recommendations
	<p>disseminated by the MoEYS.</p> <ul style="list-style-type: none"> -Parents agree to accept the above educational principles. <p>Others:</p> <ul style="list-style-type: none"> -Curriculum development -Science teaching and mixed-methods teaching -Raise teachers' salaries and benefits. -The teacher tries to teach. The students are like a tree stump. The teacher explains to the students, but it seems useless (because playing the phone until they forget about the study; there is internet, students play games rather than study) -Practitioners (implementing and providing feedback)
<p>3. Measurement and evaluation</p>	<p>Monitoring and Providing Feedback (f=6)</p> <ul style="list-style-type: none"> -The Ministry of Education or education officials should have measures to monitor and establish a clear evaluation system and be able to find key indicators to increase the validity of the unit or evaluation committee. -Regularly monitor student learning outcomes -Teachers, management, local authorities, and teachers must pay attention to teaching parents to help monitor their children regularly, and notify, disseminate and provide feedback. - Teachers and principals must monitor every teaching time and look at students' learning outcomes. -The management team (monitoring student learning outcomes and analyzing, evaluating and improving) teachers (monitoring results compared to implementation and editing or creating new ideas) and parents or guardians (providing feedback) -Teachers and school leaders need to provide each other with information to facilitate assessment. <p>(f=6)</p> <p>Fair and Accurate Assessments (f=4)</p> <ul style="list-style-type: none"> -Fair exams organized by the Ministry, schools and teachers. -Participants in the assessment for the skills development are the heads of all units according to the hierarchy and role in each section, based on truth and accuracy, focusing on the knowledge and skills that reflect each other that we think is acceptable. -The Ministry, Relevant institutions, organizations, schools (teachers), and guardians of students must evaluate thoroughly. -Teachers must provide accuracy, fairness, impartiality. <p>(f=4)</p> <p>Regular Testing (f=2)</p> <ul style="list-style-type: none"> -Monthly, semesterly, yearly tests, and final exams for each class by preparing the exams for each subject well in all aspects. -The management team and teachers must prepare monthly and semester exams regularly ... <p>(f=2)</p> <p>Adopting Standardized Tests (f=2)</p>

Academic Management	Comments and Recommendations
	<p>-Teachers must conduct standardized exams.</p> <p>-Standard test (f=2)</p> <p>Student Self-Study (f=2)</p> <p>-Students need to learn to research documents related to skill development and apply something new for themselves, family and society.</p> <p>- Students have a spirit of self-study on a regular basis, which allows them to develop both knowledge and innovation.</p> <p>Others:</p> <p>-Strive to train students to complete the curriculum</p> <p>-Teachers have a role to play in leading and evaluating students' learning.</p> <p>-The ministry, schools, municipal/provincial departments, and all institutions must help each other, do not be apathetic, do not be irresponsible so that the younger generation does not blame us as adults.</p> <p>-Lack of transparency; open access to the education process is not allowed to all stakeholders.</p> <p>-Must have a clear vision, a clear plan and must inform the followers about the plan and direction to know and have the participation of all parties involved.</p> <p>-The Ministry must have an independent and high-willed inspectors. School directors have a conscience about making education a priority.</p> <p>-Teachers who can understand the purpose of the assessment and the level of assessment.</p> <p>-Measurement and evaluation are shown through better work performance, better quality, and time saving.</p> <p>-Schools, teachers, school administrators, municipal/provincial departments, and the ministry encourage, motivate, and provide opportunities for students to participate in brainstorming activities and disseminate these ideas as much as possible during class.</p> <p>-The school directors and technical team leaders help to constructively criticize negative points in addition to points to be improved, especially praising the good or positive points to show to be a better motivation.</p> <p>-In order to develop the innovative leadership skills of the students, teachers need to have a clear authentication approach.</p> <p>-I think the student assessment system needs to be relevant and in-depth, focusing on developing innovation leadership skills so that students have a broad and long-term mindset and thinking.</p> <p>-The ministries, school directors, teachers, and guardians, because the evaluation can be conducted by more people, more institutions the better, the evaluation must be repeated more often after the implementation of programs or plans and</p>

Academic Management	Comments and Recommendations
	<p>strategies.</p> <ul style="list-style-type: none"> -These include discipline compliance, giving values, and full work performance. - Especially, the authorities must prevent gambling, especially drugs, alcohol, and cigarettes, which make young people crazy and do not care about education. -Raise teachers' salaries and salaries. -Country leaders, the Ministry, school leaders, teachers, parents, students must be involved with care and willing to achieve the planned results to reduce corruption as much as possible. -Establishment of a separate committee (participation of experienced teachers) and with the approval of the ministry, municipal/provincial departments and school management. -Teachers!!!! But lately, we have seen that only officials other than the teachers themselves go to receive additional education, which they will never teach the students.

Table 36

Summary of Priority Needs, and Internal Environmental Analysis Results of Academic Management Based on the Concept of Innovation Leadership Skills

Academic Management Based on the Concept of Innovation Leadership Skills	Priority Needs		High/ Low	SWOT
	PNI _{modified}	Rank	Group	Result
Curriculum Development	0.317	3	Low	S
1. Innovation Vision and Strategy	0.355	1	High	W
1.1 Realizing innovation vision	0.368	1	High	W
1.2 Strategic thinking	0.358	2	High	W
1.3 Managing risks	0.338	3	High	W
2. Innovative Thinking	0.314	2	Low	S
2.1 Demonstrating curiosity	0.287	13	Low	S
2.2 Developing Empathy for others	0.327	8	High	W
2.3 Opportunity exploration	0.332	5	High	W
2.4 Assaulting assumptions	0.328	7	High	W
2.5 Proactive thinking	0.302	10	Low	S
2.6 Idea generation	0.309	9	Low	S
2.7 Idea championing	0.297	11	Low	S
2.8 Idea application	0.331	6	High	W
3. Innovation Recognition and Support	0.297	3	Low	S
3.1 Leading courageously	0.285	14	Low	S
3.2 Leading by example	0.281	15	Low	S
3.3 Promoting a culture of trust	0.294	12	Low	S
3.4 Recognizing the innovators	0.333	4	High	W
Teaching and Learning	0.333	1	High	W

Academic Management Based on the Concept of Innovation Leadership Skills	Priority Needs		High/ Low Group	SWOT Result
	PNI _{modified}	Rank		
1. Innovation Vision and Strategy	0.363	1	High	W
1.1 Realizing innovation vision	0.379	1	High	W
1.2 Strategic thinking	0.352	3	High	W
1.3 Managing risks	0.359	2	High	W
2. Innovative Thinking	0.332	2	Low	S
2.1 Demonstrating curiosity	0.318	12	Low	S
2.2 Developing Empathy for others	0.346	4	High	W
2.3 Opportunity exploration	0.342	5	High	W
2.4 Assaulting assumptions	0.340	6	Low	S
2.5 Proactive thinking	0.339	7	Low	S
2.6 Idea generation	0.321	10	Low	S
2.7 Idea championing	0.320	11	Low	S
2.8 Idea application	0.332	9	Low	S
3. Innovation Recognition and Support	0.314	3	Low	S
3.1 Leading courageously	0.303	15	Low	S
3.2 Leading by example	0.307	14	Low	S
3.3 Promoting a culture of trust	0.311	13	Low	S
3.4 Recognizing the innovators	0.337	8	Low	S
Measurement and Evaluation	0.332	2	High	W
1. Innovation Vision and Strategy	0.558	1	High	W
1.1 Realizing innovation vision	0.379	1	High	W
1.2 Strategic thinking	0.366	2	High	W
1.3 Managing risks	0.350	3	High	W
2. Innovative Thinking	0.526	2	Low	S
2.1 Demonstrating curiosity	0.321	11	Low	S
2.2 Developing Empathy for others	0.344	4	High	W
2.3 Opportunity exploration	0.339	5	Low	S
2.4 Assaulting assumptions	0.325	10	Low	S
2.5 Proactive thinking	0.331	7	Low	S
2.6 Idea generation	0.330	8	Low	S
2.7 Idea championing	0.319	12	Low	S
2.8 Idea application	0.336	6	Low	S
3. Innovation Recognition and Support	0.512	3	Low	S
3.1 Leading courageously	0.308	14	Low	S
3.2 Leading by example	0.303	15	Low	S
3.3 Promoting a culture of trust	0.318	13	Low	S
3.4 Recognizing the innovators	0.326	9	Low	S

Table 37

Summary of Priority Needs, and External Environmental Analysis Results of Academic Management Based on the Concept of Innovation Leadership Skills

Academic Management Based on the Concept of Innovation Leadership Skills	Priority Needs		High/ Low Group	SWOT Result
	PNI _{modified}	Rank		
Political-Legal Factors	0.334	4	Low	O
Curriculum Development	0.330	3	Low	O
1. Innovation Vision and Strategy	0.338	1	High	T
1.1 Realizing innovation vision	0.334	5	High	T
1.2 Strategic thinking	0.345	2	High	T
1.3 Managing risks	0.334	5	High	T
2. Innovative Thinking	0.332	2	Low	O
2.1 Demonstrating curiosity	0.330	9	High	T
2.2 Developing Empathy for others	0.347	1	High	T
2.3 Opportunity exploration	0.336	4	High	T
2.4 Assaulting assumptions	0.327	11	Low	O
2.5 Proactive thinking	0.332	8	High	T
2.6 Idea generation	0.330	9	High	T
2.7 Idea championing	0.320	13	Low	O
2.8 Idea application	0.333	7	High	T
3. Innovation Recognition and Support	0.321	3	Low	O
3.1 Leading courageously	0.323	12	Low	O
3.2 Leading by example	0.311	15	Low	O
3.3 Promoting a culture of trust	0.312	14	Low	O
3.4 Recognizing the innovators	0.341	3	High	T
Teaching and Learning	0.333	2	Low	O
1. Innovation Vision and Strategy	0.355	1	High	T
1.1 Realizing innovation vision	0.363	1	High	T
1.2 Strategic thinking	0.356	2	High	T
1.3 Managing risks	0.346	3	High	T
2. Innovative Thinking	0.330	2	High	T
2.1 Demonstrating curiosity	0.330	8	Low	O
2.2 Developing Empathy for others	0.344	4	High	T
2.3 Opportunity exploration	0.327	11	Low	O
2.4 Assaulting assumptions	0.328	10	Low	O
2.5 Proactive thinking	0.331	6	Low	O
2.6 Idea generation	0.331	6	Low	O
2.7 Idea championing	0.314	15	Low	O
2.8 Idea application	0.335	5	Low	O
3. Innovation Recognition and Support	0.323	3	Low	O
3.1 Leading courageously	0.318	14	Low	O
3.2 Leading by example	0.323	12	Low	O
3.3 Promoting a culture of trust	0.323	12	Low	O
3.4 Recognizing the innovators	0.329	9	Low	O
Measurement and Evaluation	0.338	1	High	T
1. Innovation Vision and Strategy	0.348	1	High	T

Academic Management Based on the Concept of Innovation Leadership Skills	Priority Needs		High/ Low Group	SWOT Result
	PNI _{modified}	Rank		
1.1 Realizing innovation vision	0.358	1	High	T
1.2 Strategic thinking	0.343	6	High	T
1.3 Managing risk	0.344	5	High	T
2. Innovative Thinking	0.338	2	Low	O
2.1 Demonstrating curiosity	0.331	12	Low	O
2.2 Developing Empathy for others	0.350	2	High	T
2.3 Opportunity exploration	0.348	3	High	T
2.4 Assaulting assumptions	0.333	9	Low	O
2.5 Proactive thinking	0.337	8	Low	O
2.6 Idea generation	0.333	9	Low	O
2.7 Idea championing	0.327	13	Low	O
2.8 Idea application	0.348	3	High	T
3. Innovation Recognition and Support	0.329	3	Low	O
3.1 Leading courageously	0.317	15	Low	O
3.2 Leading by example	0.326	14	Low	O
3.3 Promoting a culture of trust	0.333	9	Low	O
3.4 Recognizing the innovators	0.339	7	High	T
Economic Factors	0.343	3	High	T
Curriculum Development	0.337	3	Low	O
1. Innovation Vision and Strategy	0.351	1	High	T
1.1 Realizing innovation vision	0.355	2	High	T
1.2 Strategic thinking	0.334	9	Low	O
1.3 Managing risks	0.364	1	High	T
2. Innovative Thinking	0.335	2	Low	O
2.1 Demonstrating curiosity	0.322	15	Low	O
2.2 Developing Empathy for others	0.336	7	Low	O
2.3 Opportunity exploration	0.348	3	High	T
2.4 Assaulting assumptions	0.329	12	Low	O
2.5 Proactive thinking	0.338	6	Low	O
2.6 Idea generation	0.334	9	Low	O
2.7 Idea championing	0.330	11	Low	O
2.8 Idea application	0.341	5	Low	O
3. Innovation Recognition and Support	0.332	3	Low	O
3.1 Leading courageously	0.323	14	Low	O
3.2 Leading by example	0.325	13	Low	O
3.3 Promoting a culture of trust	0.335	8	Low	O
3.4 Recognizing the innovators	0.345	4	High	T
Teaching and Learning	0.349	1	High	T
1. Innovation Vision and Strategy	0.356	1	High	T
1.1 Realizing innovation vision	0.359	2	High	T
1.2 Strategic thinking	0.351	7	High	T
1.3 Managing risks	0.357	4	High	T
2. Innovative Thinking	0.349	2	Low	O
2.1 Demonstrating curiosity	0.321	15	Low	O
2.2 Developing Empathy for others	0.375	1	High	T
2.3 Opportunity exploration	0.347	11	Low	O
2.4 Assaulting assumptions	0.352	5	High	T

Academic Management Based on the Concept of Innovation Leadership Skills	Priority Needs		High/ Low Group	SWOT Result
	PNI _{modified}	Rank		
2.5 Proactive thinking	0.348	9	High	T
2.6 Idea generation	0.348	9	High	T
2.7 Idea championing	0.351	7	High	T
2.8 Idea application	0.352	5	High	T
3. Innovation Recognition and Support	0.346	3	Low	O
3.1 Leading courageously	0.346	12	Low	O
3.2 Leading by example	0.345	13	Low	O
3.3 Promoting a culture of trust	0.334	14	Low	O
3.4 Recognizing the innovators	0.359	2	High	T
Measurement and Evaluation	0.344	2	High	T
1. Innovation Vision and Strategy	0.371	1	High	T
1.1 Realizing innovation vision	0.375	1	High	T
1.2 Strategic thinking	0.369	3	High	T
1.3 Managing risks	0.370	2	High	T
2. Innovative Thinking	0.339	2	Low	O
2.1 Demonstrating curiosity	0.330	12	Low	O
2.2 Developing Empathy for others	0.350	5	High	T
2.3 Opportunity exploration	0.351	4	High	T
2.4 Assaulting assumptions	0.323	15	Low	O
2.5 Proactive thinking	0.337	9	Low	O
2.6 Idea generation	0.342	7	Low	O
2.7 Idea championing	0.343	6	Low	O
2.8 Idea application	0.340	8	Low	O
3. Innovation Recognition and Support	0.332	3	Low	O
3.1 Leading courageously	0.334	11	Low	O
3.2 Leading by example	0.330	12	Low	O
3.3 Promoting a culture of trust	0.329	14	Low	O
3.4 Recognizing the innovators	0.335	10	Low	O
Sociocultural Factors	0.348	1	High	T
Curriculum Development	0.347	3	Low	O
1. Innovation Vision and Strategy	0.363	1	High	T
1.1 Realizing innovation vision	0.372	2	High	T
1.2 Strategic thinking	0.365	3	High	T
1.3 Managing risks	0.353	5	Low	O
2. Innovative Thinking	0.347	2	Low	O
2.1 Demonstrating curiosity	0.338	12	Low	O
2.2 Developing Empathy for others	0.381	1	High	T
2.3 Opportunity exploration	0.339	10	Low	O
2.4 Assaulting assumptions	0.342*	7	Low	O
2.5 Proactive thinking	0.355	4	Low	O
2.6 Idea generation	0.342*	7	Low	O
2.7 Idea championing	0.339	10	Low	O
2.8 Idea application	0.341	9	Low	O
3. Innovation Recognition and Support	0.336	3	Low	O
3.1 Leading courageously	0.332	15	Low	O
3.2 Leading by example	0.335	13	Low	O
3.3 Promoting a culture of trust	0.335	13	Low	O

Academic Management Based on the Concept of Innovation Leadership Skills	Priority Needs		High/ Low Group	SWOT Result
	PNI _{modified}	Rank		
3.4 Recognizing the innovators	0.344	6	Low	O
Teaching and Learning	0.350	1	High	T
1. Innovation Vision and Strategy	0.367	1	High	T
1.1 Realizing innovation vision	0.371	1	High	T
1.2 Strategic thinking	0.361	3	High	T
1.3 Managing risk	0.368	2	High	T
2. Innovative Thinking	0.349	2	Low	O
2.1 Demonstrating curiosity	0.341	11	Low	O
2.2 Developing Empathy for others	0.347	8	Low	O
2.3 Opportunity exploration	0.351	6	Low	O
2.4 Assaulting assumptions	0.348	7	Low	O
2.5 Proactive thinking	0.360	5	High	T
2.6 Idea generation	0.338	13	Low	O
2.7 Idea championing	0.345	10	Low	O
2.8 Idea application	0.361	3	High	T
3. Innovation Recognition and Support	0.340	3	Low	O
3.1 Leading courageously	0.336	15	Low	O
3.2 Leading by example	0.338	13	Low	O
3.3 Promoting a culture of trust	0.339	12	Low	O
3.4 Recognizing the innovators	0.347	8	Low	O
Measurement and Evaluation	0.348	2	Low	O
1. Innovation Vision and Strategy	0.353	1	High	T
1.1 Realizing innovation vision	0.374	1	High	T
1.2 Strategic thinking	0.342	10	Low	O
1.3 Managing risk	0.345	9	Low	O
2. Innovative Thinking	0.350	2	High	T
2.1 Demonstrating curiosity	0.350	8	Low	O
2.2 Developing Empathy for others	0.351	6	High	T
2.3 Opportunity exploration	0.369	2	High	T
2.4 Assaulting assumptions	0.353	5	High	T
2.5 Proactive thinking	0.354	3	High	T
2.6 Idea generation	0.338	12	Low	O
2.7 Idea championing	0.338	12	Low	O
2.8 Idea application	0.351	6	High	T
3. Innovation Recognition and Support	0.338	3	Low	O
3.1 Leading courageously	0.339	11	Low	O
3.2 Leading by example	0.333	14	Low	O
3.3 Promoting a culture of trust	0.327	15	Low	O
3.4 Recognizing the innovators	0.354	3	High	T
Technological Factors	0.346	2	High	T
Curriculum Development	0.345	2	Low	O
1. Innovation Vision and Strategy	0.353	1	High	T
1.1 Realizing innovation vision	0.374	1	High	T
1.2 Strategic thinking	0.342	10	Low	O
1.3 Managing risk	0.345	9	Low	O
2. Innovative Thinking	0.350	2	High	T
2.1 Demonstrating curiosity	0.350	8	Low	O

Academic Management Based on the Concept of Innovation Leadership Skills	Priority Needs		High/ Low Group	SWOT Result
	PNI _{modified}	Rank		
2.2 Developing Empathy for others	0.351	6	High	T
2.3 Opportunity exploration	0.369	2	High	T
2.4 Assaulting assumptions	0.353	5	High	T
2.5 Proactive thinking	0.354	3	High	T
2.6 Idea generation	0.338	12	Low	O
2.7 Idea championing	0.338	12	Low	O
2.8 Idea application	0.351	6	High	T
3. Innovation Recognition and Support	0.338	3	Low	O
3.1 Leading courageously	0.339	11	Low	O
3.2 Leading by example	0.333	14	Low	O
3.3 Promoting a culture of trust	0.327	15	Low	O
3.4 Recognizing the innovators	0.354	3	High	T
Teaching and Learning	0.351	1	High	T
1. Innovation Vision and Strategy	0.356	1	High	T
1.1 Realizing innovation vision	0.358	4	High	T
1.2 Strategic thinking	0.359	3	High	T
1.3 Managing risk	0.350	8	Low	O
2. Innovative Thinking	0.353	2	High	T
2.1 Demonstrating curiosity	0.337	14	Low	O
2.2 Developing Empathy for others	0.376	1	High	T
2.3 Opportunity exploration	0.365	2	High	T
2.4 Assaulting assumptions	0.350	8	Low	O
2.5 Proactive thinking	0.357	5	High	T
2.6 Idea generation	0.345	11	Low	O
2.7 Idea championing	0.339	13	Low	O
2.8 Idea application	0.355	6	High	T
3. Innovation Recognition and Support	0.344	3	Low	O
3.1 Leading courageously	0.344	12	Low	O
3.2 Leading by example	0.331	15	Low	O
3.3 Promoting a culture of trust	0.348	10	Low	O
3.4 Recognizing the innovators	0.355	6	High	T
Measurement and Evaluation	0.343	3	Low	O
1. Innovation Vision and Strategy	0.350	1	High	T
1.1 Realizing innovation vision	0.356	2	High	T
1.2 Strategic thinking	0.347	5	High	T
1.3 Managing risk	0.348	4	High	T
2. Innovative Thinking	0.344	2	High	T
2.1 Demonstrating curiosity	0.341	9	Low	O
2.2 Developing Empathy for others	0.362	1	High	T
2.3 Opportunity exploration	0.353	3	High	T
2.4 Assaulting assumptions	0.340	11	Low	O
2.5 Proactive thinking	0.330	13	Low	O
2.6 Idea generation	0.343	7	Low	O
2.7 Idea championing	0.333	12	Low	O
2.8 Idea application	0.347	5	High	T
3. Innovation Recognition and Support	0.336	3	Low	O
3.1 Leading courageously	0.330	13	Low	O

Academic Management Based on the Concept of Innovation Leadership Skills	Priority Needs		High/ Low Group	SWOT Result
	PNI _{modified}	Rank		
3.2 Leading by example	0.341	9	Low	O
3.3 Promoting a culture of trust	0.328	15	Low	O
3.4 Recognizing the innovators	0.342	8	Low	O

4.4 Developing Academic Management Strategies of Secondary Schools Based on the Concept of Innovation Leadership Skills

As stated in Chapter 3, TOWS matrix was used to develop secondary schools' academic management strategies based on the concept of innovation leadership skills. The following sections present a summary of strengths, weaknesses, opportunities, threats, and TOWS matrix.

Table 38

Strengths and Weaknesses of Academic Management Strategies of Secondary Schools Based on the Concept of Innovation Leadership Skills

Strength-S (PNI_{modified})	Weaknesses-W (PNI_{modified})
S1 Curriculum Development (.317)	W1 Teaching and Learning (.333)
S11 Curriculum development in developing <i>Innovation Recognition and Support</i> regarding <i>Leading by example</i> (.281)	W11 Teaching and Learning in developing <i>Innovation Vision and Strategy</i> regarding <i>Realizing innovation vision</i> (.379)
S12 Curriculum development in developing <i>Innovation Recognition and Support</i> regarding <i>Leading courageously</i> (.285)	W12 Teaching and Learning in developing <i>Innovation Vision and Strategy</i> regarding <i>Managing risk</i> (.359)
S13 Curriculum development in developing <i>Innovative Thinking</i> regarding <i>Demonstrating curiosity</i> (.287)	W13 Teaching and Learning in developing <i>Innovation Vision and Strategy</i> regarding <i>Strategic thinking</i> (.352)
S14 Curriculum development in developing <i>Innovation Recognition and Support</i> regarding <i>Promoting a culture of trust</i> (.294)	W14 Teaching and Learning in developing <i>Innovative Thinking</i> regarding <i>Developing Empathy for others</i> (.346)
S15 Curriculum development in developing <i>Innovative Thinking</i> regarding <i>Idea championing</i> (.297)	W15 <i>Innovative Thinking</i> regarding <i>Opportunity exploration</i> (.342)
S16 Curriculum development in developing <i>Innovative Thinking</i> regarding <i>Proactive thinking</i> (.302)	W2 Measurement and evaluation (.332)
S17 Curriculum development in developing <i>Innovative Thinking</i> regarding <i>Idea generation</i>	W21 Measurement and evaluation in developing <i>Innovation Vision and Strategy</i> regarding <i>Realizing innovation vision</i> (.379)
	W22 Measurement and evaluation in

<p>(.309)</p> <p>S2 Measurement and evaluation (.332)</p> <p>S21 Measurement and evaluation in developing <i>Innovation Recognition and Support</i> regarding <i>Leading by example</i> (.303)</p> <p>S22 Measurement and evaluation in developing <i>Innovation Recognition and Support</i> regarding <i>Leading courageously</i> (.308)</p> <p>S23 Measurement and evaluation in developing <i>Innovation Recognition and Support</i> regarding <i>Promoting a culture of trust</i> (.318)</p> <p>S24 Measurement and evaluation in developing <i>Innovative Thinking</i> regarding <i>Idea championing</i> (.319)</p> <p>S25 Measurement and evaluation in developing <i>Innovative Thinking</i> regarding <i>Demonstrating curiosity</i> (.321)</p> <p>S26 Measurement and evaluation in developing <i>Innovative Thinking</i> regarding <i>Assaulting assumptions</i> (.325)</p> <p>S27 Measurement and evaluation in developing <i>Innovation Recognition and Support</i> regarding <i>Recognizing the innovators</i> (.326)</p> <p>S28 Measurement and evaluation in developing <i>Innovative Thinking</i> regarding <i>Idea generation</i> (.330)</p> <p>S29 Measurement and evaluation in developing <i>Innovative Thinking</i> regarding <i>Proactive thinking</i> (.331)</p> <p>S210 Measurement and evaluation in developing <i>Innovative Thinking</i> regarding <i>Idea application</i> (.336)</p> <p>S211 Measurement and evaluation in developing <i>Innovative Thinking</i> regarding <i>Opportunity exploration</i> (.339)</p> <p>S3 Teaching and Learning (.333)</p> <p>S31 Teaching and learning in developing <i>Innovation Recognition and Support</i> regarding <i>Promoting a culture of trust</i> (0.311)</p> <p>S32 <i>Innovation Recognition and Support</i> regarding <i>Leading by example</i> (.307)</p> <p>S33 <i>Innovation Recognition and Support</i> regarding <i>Leading courageously</i> (.303)</p> <p>S3-4 <i>Innovative Thinking</i> regarding <i>Demonstrating curiosity</i> (.318)</p> <p>S35 <i>Innovative Thinking</i> regarding <i>Idea application</i> (.332)</p> <p>S36 <i>Innovative Thinking</i> regarding <i>Idea generation</i> (.321)</p>	<p>developing <i>Innovation Vision and Strategy</i> regarding <i>Strategic thinking</i> (.366)</p> <p>W23 Measurement and evaluation in developing <i>Innovation Vision and Strategy</i> regarding <i>Managing risk</i> (.350)</p> <p>W24 Measurement and evaluation in developing <i>Innovative Thinking</i> regarding <i>Developing Empathy for others</i> (.344)</p> <p>W3 Curriculum Development (.317)</p> <p>W31 Curriculum development in developing <i>Innovation Vision and Strategy</i> regarding <i>Realizing innovation vision</i> (.368)</p> <p>W32 Curriculum development in developing <i>Innovation Vision and Strategy</i> regarding <i>Strategic thinking</i> (.358)</p> <p>W33 Curriculum development in developing <i>Innovation Vision and Strategy</i> regarding <i>Managing risk</i> (.338)</p> <p>W34 Curriculum development in developing <i>Innovation Recognition and Support</i> regarding <i>Recognizing the innovators</i> (.333)</p> <p>W35 Curriculum development in developing <i>Innovative Thinking</i> regarding <i>Opportunity exploration</i> (.332)</p> <p>W36 <i>Innovative Thinking</i> regarding <i>Idea application</i> (.331)</p> <p>W37 Curriculum development in developing <i>Innovative Thinking</i> regarding <i>Assaulting assumptions</i> (.328)</p> <p>W38 Curriculum development in developing <i>Innovative Thinking</i> regarding <i>Developing Empathy for others</i> (.327)</p>
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<p>S37 <i>Innovative Thinking</i> regarding <i>Idea championing</i> (.320)</p> <p>S38 <i>Innovation Recognition and Support</i> regarding <i>Recognizing the innovators</i> (.337)</p> <p>S39 <i>Innovative Thinking</i> regarding <i>Assaulting assumptions</i> (.340)</p> <p>S310 <i>Innovative Thinking</i> regarding <i>Proactive thinking</i> (.339)</p>	
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Table 39

*Opportunities and Threats of Academic Management Strategies of Secondary Schools
Based on the Concept of Innovation Leadership Skills*

Opportunities-O (PNI_{modified})	Threats-T (PNI_{modified})
<p>O1 Political-Legal Factors (.334)</p> <p>O11 Curriculum Development (.330)</p> <p>O111 Political-legal factors enable curriculum development to develop innovation leadership skills regarding <i>Innovation Recognition and Support in Leading by Example</i> (.311)</p> <p>O112 Political-legal factors enable curriculum development to develop innovation leadership skills regarding <i>Innovation Recognition and Support in Promoting a culture of trust</i> (.312)</p> <p>O113 Political-legal factors enable curriculum development to develop innovation leadership skills regarding <i>Innovative Thinking in Idea championing</i> (.320)</p> <p>O114 Political-legal factors enable curriculum development to develop innovation leadership skills regarding <i>Innovation Recognition and Support in Leading courageously</i> (.323)</p> <p>O115 Political-legal factors enable curriculum development to develop innovation leadership skills regarding <i>Innovative Thinking in Assaulting assumptions</i> (.327)</p> <p>O12 Teaching and Learning (.333)</p> <p>O121 Political-legal factors enable teaching and learning to develop innovation leadership skills regarding <i>Innovative Thinking in Idea championing</i> (.314)</p> <p>O122 Political-legal factors enable teaching and learning to develop innovation leadership skills regarding <i>Innovation Recognition and Support in</i></p>	<p>T1 Sociocultural Factors (.348)</p> <p>T11 Teaching and Learning (.350)</p> <p>T111 Sociocultural factors are a threat to teaching and learning in developing innovation leadership skills regarding <i>Innovation Vision and Strategy in Realizing innovation vision</i> (.371)</p> <p>T112 Sociocultural factors are a threat to teaching and learning in developing innovation leadership skills regarding <i>Innovation Vision and Strategy in Managing risk</i> (.368)</p> <p>T113 Sociocultural factors are a threat to teaching and learning in developing innovation leadership skills regarding <i>Innovation Vision and Strategy in Strategic thinking</i> (.361)</p> <p>T114 Sociocultural factors are a threat to teaching and learning in developing innovation leadership skills regarding <i>Innovative Thinking in Idea application</i> (.361)</p> <p>T115 Sociocultural factors are a threat to teaching and learning in developing innovation leadership skills regarding <i>Innovative Thinking in Proactive thinking</i> (.360)</p> <p>T12 Measurement and Evaluation (.348)</p> <p>T121 Sociocultural factors are a threat to measurement and evaluation in developing innovation leadership skills regarding <i>Innovation Vision and Strategy in Realizing innovation vision</i> (.374)</p> <p>T122 Sociocultural factors are a threat to</p>

Opportunities-O (PNI _{modified})	Threats-T (PNI _{modified})
<p><i>Leading courageously</i> (.318)</p> <p>O123 Political-legal factors enable teaching and learning to develop innovation leadership skills regarding <i>Innovation Recognition and Support in Leading by example</i> (.323)</p> <p>O124 Political-legal factors enable teaching and learning to develop innovation leadership skills regarding <i>Innovation Recognition and Support in Promoting a culture of trust</i> (.323)</p> <p>O125 Political-legal factors enable teaching and learning to develop innovation leadership skills regarding <i>Innovative Thinking in Opportunity exploration</i> (.327)</p> <p>O126 Political-legal factors teaching and learning to develop innovation leadership skills regarding <i>Innovative Thinking in Assaulting assumptions</i> (.328)</p> <p>O127 Political-legal factors enable teaching and learning to develop innovation leadership skills regarding <i>Innovation Recognition and Support in Recognizing the innovators</i> (.329)</p> <p>O128 Political-legal factors teaching and learning to develop innovation leadership skills regarding <i>Innovative Thinking in Demonstrating curiosity</i> (.330)</p> <p>O129 Political-legal factors teaching and learning to develop innovation leadership skills regarding <i>Innovative Thinking in Proactive thinking</i> (.331)</p> <p>O1210 Political-legal factors teaching and learning to develop innovation leadership skills regarding <i>Innovative Thinking in Idea generation</i> (.331)</p> <p>O1211 Political-legal factors teaching and learning to develop innovation leadership skills regarding <i>Innovative Thinking in Idea application</i> (.335)</p> <p>O13 Measurement and Evaluation (.338)</p> <p>O131 Political-legal factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovation Recognition and Support in Leading courageously</i> (.317)</p> <p>O132 Political-legal factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovation Recognition and Support in Leading by example</i> (.326)</p> <p>O133 Political-legal factors enable measurement and evaluation to develop innovation leadership</p>	<p>measurement and evaluation in developing innovation leadership skills regarding <i>Innovative Thinking in Opportunity exploration</i> (.369)</p> <p>T123 Sociocultural factors are a threat to measurement and evaluation in developing innovation leadership skills regarding <i>Innovative Thinking in Proactive thinking</i> (.354)</p> <p>T124 Sociocultural factors are a threat to measurement and evaluation in developing innovation leadership skills regarding <i>Innovation Recognition and Support in Recognizing the innovators</i> (.354)</p> <p>T125 Sociocultural factors are a threat to measurement and evaluation in developing innovation leadership skills regarding <i>Innovative Thinking in Assaulting assumptions</i> (.353)</p> <p>T126 Sociocultural factors are a threat to measurement and evaluation in developing innovation leadership skills regarding <i>Innovative Thinking in Developing Empathy for others</i> (.351)</p> <p>T127 Sociocultural factors are a threat to measurement and evaluation in developing innovation leadership skills regarding <i>Innovative Thinking in Idea application</i> (.351)</p> <p>T13 Curriculum Development (.347)</p> <p>T131 Sociocultural factors are a threat to curriculum development in developing innovation leadership skills regarding <i>Innovative Thinking in Developing Empathy for others</i> (.381)</p> <p>T132 Sociocultural factors are a threat to curriculum development in developing innovation leadership skills regarding <i>Innovation Vision and Strategy in Realizing innovation vision</i> (.372)</p> <p>T133 Sociocultural factors are a threat to curriculum development in developing innovation leadership skills regarding <i>Innovation Vision and Strategy in Strategic thinking</i> (.365)</p> <p>T2 Technological Factors (.346)</p> <p>T21 Teaching and Learning (.351)</p> <p>T211 Technological factors are a threat to teaching and learning in developing innovation leadership skills regarding <i>Innovative Thinking in Developing Empathy for others</i> (.376)</p> <p>T212 Technological factors are a threat to</p>

Opportunities-O (PNI _{modified})	Threats-T (PNI _{modified})
<p>skills regarding <i>Innovative Thinking</i> in <i>Idea championing</i> (.327)</p> <p>O134 Political-legal factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovative Thinking</i> in <i>Demonstrating curiosity</i> (.331)</p> <p>O135 Political-legal factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovative Thinking</i> in <i>Assaulting assumptions</i> (.333)</p> <p>O136 Political-legal factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovation Recognition and Support</i> in <i>Promoting a culture of trust</i> (.333)</p> <p>O137 Political-legal factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovative Thinking</i> in <i>Proactive thinking</i> (.337)</p> <p>O2 Economic Factors (.343)</p> <p>O21 Curriculum Development (.337)</p> <p>O211 Economic factors enable curriculum development to develop innovation leadership skills regarding <i>Innovative Thinking</i> in <i>Demonstrating curiosity</i> (.322)</p> <p>O212 Economic factors enable curriculum development to develop innovation leadership skills regarding <i>Innovation Recognition and Support</i> in <i>Leading courageously</i> (.323)</p> <p>O213 Economic factors enable curriculum development to develop innovation leadership skills regarding <i>Innovation Recognition and Support</i> in <i>Leading by example</i> (.325)</p> <p>O214 Economic factors enable curriculum development to develop innovation leadership skills regarding <i>Innovative Thinking</i> in <i>Assaulting assumptions</i> (.329)</p> <p>O215 Economic factors enable curriculum development to develop innovation leadership skills regarding <i>Innovative Thinking</i> in <i>Idea championing</i> (.330)</p> <p>O216 Economic factors enable curriculum development to develop innovation leadership skills regarding <i>Innovative Thinking</i> in <i>Idea generation</i> (.334)</p> <p>O217 Economic factors enable curriculum development to develop innovation leadership skills regarding <i>Innovation Vision and Strategy</i> in <i>Strategic thinking</i> (.334)</p>	<p>teaching and learning in developing innovation leadership skills regarding <i>Innovative Thinking</i> in <i>Opportunity exploration</i> (.365)</p> <p>T213 Technological factors are a threat to teaching and learning in developing innovation leadership skills regarding <i>Innovation Vision and Strategy</i> in <i>Realizing innovation vision</i> (.358)</p> <p>T214 Technological factors are a threat to teaching and learning in developing innovation leadership skills regarding <i>Innovation Vision and Strategy</i> in <i>Strategic thinking</i> (.359)</p> <p>T215 Technological factors are a threat to teaching and learning in developing innovation leadership skills regarding <i>Innovative Thinking</i> in <i>Proactive thinking</i> (.357)</p> <p>T216 Technological factors are a threat to teaching and learning in developing innovation leadership skills regarding <i>Innovative Thinking</i> in <i>Idea application</i> (.355)</p> <p>T217 Technological factors are a threat to teaching and learning in developing innovation leadership skills regarding <i>Innovation Recognition and Support</i> in <i>Recognizing the innovators</i> (.355)</p> <p>T22 Curriculum Development (.345)</p> <p>T221 Technological factors are a threat to curriculum development in developing innovation leadership skills regarding <i>Innovation Vision and Strategy</i> in <i>Realizing innovation vision</i> (.374)</p> <p>T222 Technological factors are a threat to curriculum development in developing innovation leadership skills regarding <i>Innovative Thinking</i> in <i>Opportunity exploration</i> (.369)</p> <p>T223 Technological factors are a threat to curriculum development in developing innovation leadership skills regarding <i>Innovation Recognition and Support</i> in <i>Recognizing the innovators</i> (.354)</p> <p>T224 Technological factors are a threat to curriculum development in developing innovation leadership skills regarding <i>Innovative Thinking</i> in <i>Proactive thinking</i> (.354)</p> <p>T225 Technological factors are a threat to curriculum development in developing innovation leadership skills regarding <i>Innovative</i></p>

Opportunities-O (PNI _{modified})	Threats-T (PNI _{modified})
<p>O218 Economic factors enable curriculum development to develop innovation leadership skills regarding <i>Innovation Recognition and Support in Promoting a culture of trust</i> (.335)</p> <p>O219 Economic factors enable curriculum development to develop innovation leadership skills regarding <i>Innovative Thinking in Developing Empathy for others</i> (.336)</p> <p>O2110 Economic factors enable curriculum development to develop innovation leadership skills regarding <i>Innovative Thinking in Proactive thinking</i> (.338)</p> <p>O2111 Economic factors enable curriculum development to develop innovation leadership skills regarding <i>Innovative Thinking in Idea application</i> (.341)</p> <p>O22 Measurement and Evaluation (.344)</p> <p>O221 Economic factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovative Thinking in Assaulting assumptions</i> (.323)</p> <p>O222 Economic factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovation Recognition and Support in Promoting a culture of trust</i> (.329)</p> <p>O223 Economic factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovation Recognition and Support in Leading by example</i> (.330)</p> <p>O224 Economic factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovative Thinking in Demonstrating curiosity</i> (.330)</p> <p>O225 Economic factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovation Recognition and Support in Leading courageously</i> (.334)</p> <p>O226 Economic factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovation Recognition and Support in Recognizing the innovators</i> (.335)</p> <p>O227 Economic factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovative Thinking in Proactive thinking</i> (.337)</p> <p>O228 Economic factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovative Thinking in Idea</i></p>	<p><i>Thinking in Assaulting assumptions</i> (.353)</p> <p>T226 Technological factors are a threat to curriculum development in developing innovation leadership skills regarding <i>Innovative Thinking in Developing Empathy for others</i> (.351)</p> <p>T227 Technological factors are a threat to curriculum development in developing innovation leadership skills regarding <i>Innovative Thinking in Idea application</i> (.351)</p> <p>T23 Measurement and Evaluation (.343)</p> <p>T231 Technological factors are a threat to measurement and evaluation in developing innovation leadership skills regarding <i>Innovative Thinking in Developing Empathy for others</i> (.362)</p> <p>T232 Technological factors are a threat to measurement and evaluation in developing innovation leadership skills regarding <i>Innovation Vision and Strategy in Realizing innovation vision</i> (.356)</p> <p>T233 Technological factors are a threat to measurement and evaluation in developing innovation leadership skills regarding <i>Innovative Thinking in Opportunity exploration</i> (.353)</p> <p>T234 Technological factors are a threat to measurement and evaluation in developing innovation leadership skills regarding <i>Innovation Vision and Strategy in Managing risk</i> (.348)</p> <p>T235 Technological factors are a threat to measurement and evaluation in developing innovation leadership skills regarding <i>Innovation Vision and Strategy in Strategic thinking</i> (.347)</p> <p>T234 Technological factors are a threat to measurement and evaluation in developing innovation leadership skills regarding <i>Innovative Thinking in Idea application</i> (.347)</p> <p>T3 Economic Factors (.343)</p> <p>T31 Teaching and Learning (.349)</p> <p>T311 Economic factors are a threat to teaching and learning in developing innovation leadership skills regarding <i>Innovative Thinking in Developing Empathy for others</i> (.375)</p> <p>T312 Economic are a threat to teaching and learning in developing innovation leadership skills regarding <i>Innovation Vision and Strategy</i></p>

Opportunities-O (PNI_{modified})	Threats-T (PNI_{modified})
<p><i>application</i> (.340)</p> <p>O229 Economic factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovative Thinking in Idea generation</i> (.342)</p> <p>O2210 Economic factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovative Thinking in Idea championing</i> (.343)</p> <p>O23 Teaching and Learning (.349)</p> <p>O231 Economic factors enable teaching and learning to develop innovation leadership skills regarding <i>Innovative Thinking in Demonstrating curiosity</i> (.321)</p> <p>O232 Economic factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovation Recognition and Support in Promoting a culture of trust</i> (.334)</p> <p>O233 Economic factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovation Recognition and Support in Leading by example</i> (.345)</p> <p>O234 Economic factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovation Recognition and Support in Leading courageously</i> (.346)</p> <p>O235 Economic factors enable teaching and learning to develop innovation leadership skills regarding <i>Innovative Thinking in Opportunity exploration</i> (.347)</p> <p>O3 Technological Factors (.346)</p> <p>O31 Measurement and Evaluation (.343)</p> <p>O311 Technological factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovation Recognition and Support in Promoting a culture of trust</i> (.328)</p> <p>O312 Technological factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovation Recognition and Support in Leading courageously</i> (.330)</p> <p>O313 Technological factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovative Thinking in Proactive thinking</i> (.330)</p> <p>O314 Technological factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovative Thinking in Idea championing</i> (.333)</p>	<p>in <i>Realizing innovation vision</i> (.359)</p> <p>T313 Economic factors are a threat to teaching and learning in developing innovation leadership skills regarding <i>Innovation Recognition and Support in Recognizing the innovators</i> (.359)</p> <p>T314 Economic factors are a threat to teaching and learning in developing innovation leadership skills regarding <i>Innovation Vision and Strategy in Managing risk</i> (.357)</p> <p>T315 Economic factors are a threat to teaching and learning in developing innovation leadership skills regarding <i>Innovative Thinking in Assaulting assumptions</i> (.352)</p> <p>T316 Economic factors are a threat to teaching and learning in developing innovation leadership skills regarding <i>Innovative Thinking in Idea application</i> (.352)</p> <p>T317 Economic factors are a threat to teaching and learning in developing innovation leadership skills regarding <i>Innovative Thinking in Idea championing</i> (.351)</p> <p>T318 Economic factors are a threat to teaching and learning in developing innovation leadership skills regarding <i>Innovation Vision and Strategy in Strategic thinking</i> (.351)</p> <p>T319 Economic factors are a threat to teaching and learning in developing innovation leadership skills regarding <i>Innovative Thinking in Proactive thinking</i> (.348)</p> <p>T3110 Economic factors are a threat to teaching and learning in developing innovation leadership skills regarding <i>Innovative Thinking in Idea generation</i> (.348)</p> <p>T32 Measurement and Evaluation (.344)</p> <p>T321 Economic factors are a threat to measurement and evaluation in developing innovation leadership skills regarding <i>Innovation Vision and Strategy in Realizing innovation vision</i> (.375)</p> <p>T322 Economic factors are a threat to measurement and evaluation in developing innovation leadership skills regarding <i>Innovation Vision and Strategy in Managing risk</i> (.370)</p> <p>T323 Economic factors are a threat to measurement and evaluation in developing innovation leadership skills regarding <i>Innovation Vision and Strategy in Strategic</i></p>

Opportunities-O (PNI _{modified})	Threats-T (PNI _{modified})
<p>O315 Technological factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovative Thinking in Assaulting assumptions</i> (.340)</p> <p>O316 Technological factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovative Thinking in Demonstrating curiosity</i> (.341)</p> <p>O317 Technological factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovation Recognition and Support in Recognizing the innovators</i> (.342)</p> <p>O318 Technological factors enable measurement and evaluation to develop innovation leadership skills regarding innovation leadership skills regarding <i>Innovative Thinking in Idea generation</i> (.343)</p> <p>O32 Curriculum Development (.345)</p> <p>O321 Technological factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovation Recognition and Support in Promoting a culture of trust</i> (.327)</p> <p>O322 Technological factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovation Recognition and Support in Leading by example</i> (.333)</p> <p>O323 Technological factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovative Thinking in Idea generation</i> (.338)</p> <p>O324 Technological factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovative Thinking in Idea championing</i> (.338)</p> <p>O325 Technological factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovation Recognition and Support in Leading courageously</i> (.339)</p> <p>O326 Technological factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovation Vision and Strategy in Strategic thinking</i> (.342)</p> <p>O327 Technological factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovation Vision and Strategy in Managing risk</i> (.345)</p> <p>O328 Technological factors enable measurement and evaluation to develop innovation leadership</p>	<p><i>thinking</i> (.369)</p> <p>T324 Economic factors are a threat to measurement and evaluation in developing innovation leadership skills regarding <i>Innovative Thinking in Opportunity exploration</i> (.351)</p> <p>T325 Economic factors are a threat to measurement and evaluation in developing innovation leadership skills regarding <i>Innovative Thinking in Developing Empathy for others</i> (.350)</p> <p>T33 Curriculum Development (.337)</p> <p>T331 Economic factors are a threat to curriculum development in developing innovation leadership skills regarding <i>Innovation Vision and Strategy in Managing risk</i> (.364)</p> <p>T332 Economic factors are a threat to curriculum development in developing innovation leadership skills regarding <i>Innovation Vision and Strategy in Realizing innovation vision</i> (.355)</p> <p>T333 Economic factors are a threat to curriculum development in developing innovation leadership skills regarding <i>Innovative Thinking in Opportunity exploration</i> (.348)</p> <p>T334 Economic factors are a threat to curriculum development in developing innovation leadership skills regarding <i>Innovation Recognition and Support in Recognizing the innovators</i> (.345)</p> <p>T4 Political-Legal Factors (.334)</p> <p>T41 Measurement and Evaluation (.338)</p> <p>T411 Political-legal factors are a threat to measurement and evaluation in developing innovation leadership skills regarding <i>Innovation Vision and Strategy in Realizing innovation vision</i> (.358)</p> <p>T412 Political-legal factors are a threat to measurement and evaluation in developing innovation leadership skills regarding <i>Innovative Thinking in Developing Empathy for others</i> (.350)</p> <p>T413 Political-legal factors are a threat to measurement and evaluation in developing innovation leadership skills regarding <i>Innovative Thinking in Opportunity exploration</i> (.348)</p> <p>T414 Political-legal factors are a threat to measurement and evaluation in developing</p>

Opportunities-O (PNI _{modified})	Threats-T (PNI _{modified})
<p>skills regarding <i>Innovative Thinking</i> in <i>Demonstrating curiosity</i> (.350)</p> <p>O33 Teaching and Learning (.351)</p> <p>O331 Technological factors enable teaching and learning to develop innovation leadership skills regarding <i>Innovation Recognition and Support</i> in <i>Leading by example</i> (.331)</p> <p>O332 Technological factors enable teaching and learning to develop innovation leadership skills regarding <i>Innovative Thinking</i> in <i>Demonstrating curiosity</i> (.337)</p> <p>O333 Technological factors enable teaching and learning to develop innovation leadership skills regarding <i>Innovative Thinking</i> in <i>Idea championing</i> (.339)</p> <p>O334 Technological factors enable teaching and learning to develop innovation leadership skills regarding <i>Innovation Recognition and Support</i> in <i>Leading courageously</i> (.344)</p> <p>O335 Technological factors enable teaching and learning to develop innovation leadership skills regarding <i>Innovative Thinking</i> in <i>Idea generation</i> (.345)</p> <p>O336 Technological factors enable teaching and learning to develop innovation leadership skills regarding <i>Innovation Recognition and Support</i> in <i>Promoting a culture of trust</i> (.348)</p> <p>O337 Technological factors enable teaching and learning to develop innovation leadership skills regarding <i>Innovation Vision and Strategy</i> in <i>Managing risk</i> (.350)</p> <p>O338 Technological factors enable teaching and learning to develop innovation leadership skills regarding <i>Innovative Thinking</i> in <i>Assaulting assumptions</i> (.350)</p> <p>Sociocultural Factors (.348)</p> <p>O41 Curriculum Development (.347)</p> <p>O411 Sociocultural factors enable curriculum development to develop innovation leadership skills regarding <i>Innovation Recognition and Support</i> in <i>Leading courageously</i> (.332)</p> <p>O412 Sociocultural factors enable curriculum development to develop innovation leadership skills regarding <i>Innovation Recognition and Support</i> in <i>Leading by example</i> (.335)</p> <p>O413 Sociocultural factors enable curriculum development to develop innovation leadership skills regarding <i>Innovation Recognition and</i></p>	<p>innovation leadership skills regarding <i>Innovative Thinking</i> in <i>Idea application</i> (.348)</p> <p>T415 Political-legal factors are a threat to measurement and evaluation in developing innovation leadership skills regarding <i>Innovation Vision and Strategy</i> in <i>Managing risk</i> (.344)</p> <p>T416 Political-legal factors are a threat to measurement and evaluation in developing innovation leadership skills regarding <i>Innovation Vision and Strategy</i> in <i>Strategic thinking</i> (.343)</p> <p>T417 Political-legal factors are a threat to measurement and evaluation in developing innovation leadership skills regarding <i>Innovation Recognition and Support</i> in <i>Recognizing the innovators</i> (.339)</p> <p>T42 Teaching and Learning (.333)</p> <p>T421 Political-legal factors are a threat to teaching and learning in developing innovation leadership skills regarding <i>Innovation Vision and Strategy</i> in <i>Realizing innovation vision</i> (.363)</p> <p>T422 Political-legal factors are a threat to teaching and learning in developing innovation leadership skills regarding <i>Innovation Vision and Strategy</i> in <i>Strategic thinking</i> (.356)</p> <p>T423 Political-legal factors are a threat to teaching and learning in developing innovation leadership skills regarding <i>Innovation Vision and Strategy</i> in <i>Managing risk</i> (.346)</p> <p>T424 Political-legal factors are a threat to teaching and learning in developing innovation leadership skills regarding <i>Innovative Thinking</i> in <i>Developing Empathy for others</i> (.344)</p> <p>T43 Curriculum Development (.330)</p> <p>T431 Political-legal factors are a threat to curriculum development in developing innovation leadership skills regarding <i>Innovative Thinking</i> in <i>Developing Empathy for others</i> (.347)</p> <p>T432 Political-legal factors are a threat to curriculum development in developing innovation leadership skills regarding <i>Innovation Vision and Strategy</i> in <i>Strategic thinking</i> (.345)</p> <p>T433 Political-legal factors are a threat to curriculum development in developing</p>

Opportunities-O (PNI _{modified})	Threats-T (PNI _{modified})
<p>Support in <i>Promoting a culture of trust</i> (.335)</p> <p>O414 Sociocultural factors enable curriculum development to develop innovation leadership skills regarding <i>Innovative Thinking</i> in <i>Demonstrating curiosity</i> (.338)</p> <p>O415 Sociocultural factors enable curriculum development to develop innovation leadership skills regarding <i>Innovative Thinking</i> in <i>Opportunity exploration</i> (.339)</p> <p>O416 Sociocultural factors enable curriculum development to develop innovation leadership skills regarding <i>Innovative Thinking</i> in <i>Idea championing</i> (.339)</p> <p>O417 Sociocultural factors enable curriculum development to develop innovation leadership skills regarding <i>Innovative Thinking</i> in <i>Idea application</i> (.341)</p> <p>O418 Sociocultural factors enable curriculum development to develop innovation leadership skills regarding <i>Innovative Thinking</i> in <i>Assaulting assumptions</i> (.342)</p> <p>O419 Sociocultural factors enable curriculum development to develop innovation leadership skills regarding <i>Innovative Thinking</i> in <i>Idea generation</i> (.342)</p> <p>O4110 Sociocultural factors enable curriculum development to develop innovation leadership skills regarding <i>Innovation Recognition and Support in Recognizing the innovators</i> (.344)</p> <p>O4111 Sociocultural factors enable curriculum development to develop innovation leadership skills regarding <i>Innovation Vision and Strategy</i> in <i>Managing risk</i> (.353)</p> <p>O4112 Sociocultural factors enable curriculum development to develop innovation leadership skills regarding <i>Innovative Thinking</i> in <i>Proactive thinking</i> (.355)</p>	<p>innovation leadership skills regarding <i>Innovation Recognition and Support in Recognizing the innovators</i> (.341)</p> <p>T434 Political-legal factors are a threat to curriculum development in developing innovation leadership skills regarding <i>Innovative Thinking in Opportunity exploration</i> (.336)</p> <p>T435 Political-legal factors are a threat to curriculum development in developing innovation leadership skills regarding <i>Innovation Vision and Strategy</i> in <i>Realizing innovation vision</i> (.334)</p> <p>T436 Political-legal factors are a threat to curriculum development in developing innovation leadership skills regarding <i>Innovation Vision and Strategy</i> in <i>Managing risk</i> (.334)</p> <p>T437 Political-legal factors are a threat to curriculum development in developing innovation leadership skills regarding <i>Innovative Thinking in Idea application</i> (.333)</p> <p>T438 Political-legal factors are a threat to curriculum development in developing innovation leadership skills regarding <i>Innovative Thinking in Demonstrating curiosity</i> (.330)</p> <p>T439 Political-legal factors are a threat to curriculum development in developing innovation leadership skills regarding <i>Innovative Thinking in Idea generation</i> (.330)</p>
<p>O42 Measurement and Evaluation (.348)</p> <p>O421 Sociocultural factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovation Recognition and Support in Promoting a culture of trust</i> (.327)</p> <p>O422 Sociocultural factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovation Recognition and Support in Leading by example</i> (.333)</p> <p>O423 Sociocultural factors enable measurement and evaluation to develop innovation leadership</p>	

Opportunities-O (PNI_{modified})	Threats-T (PNI_{modified})
<p>skills regarding <i>Innovative Thinking in Idea generation</i> (.338)</p> <p>O424 Sociocultural factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovative Thinking in Idea championing</i> (.338)</p> <p>O425 Sociocultural factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovation Recognition and Support in Leading courageously</i> (.339)</p> <p>O426 Sociocultural factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovation Vision and Strategy in Strategic thinking</i> (.342)</p> <p>O427 Sociocultural factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovation Vision and Strategy in Managing risk</i> (.345)</p> <p>O428 Sociocultural factors enable measurement and evaluation to develop innovation leadership skills regarding <i>Innovative Thinking in Demonstrating curiosity</i> (.350)</p> <p>O43 Teaching and Learning (.350)</p> <p>O431 Sociocultural factors enable teaching and learning to develop innovation leadership skills regarding <i>Innovation Recognition and Support in Leading courageously</i> (.336)</p> <p>O432 Sociocultural factors enable teaching and learning to develop innovation leadership skills regarding <i>Innovative Thinking in Idea generation</i> (.338)</p> <p>O433 Sociocultural factors enable teaching and learning to develop innovation leadership skills regarding <i>Innovation Recognition and Support in Leading by example</i> (.338)</p> <p>O434 Sociocultural factors enable teaching and learning to develop innovation leadership skills regarding <i>Innovation Recognition and Support in Promoting a culture of trust</i> (.339)</p> <p>O435 Sociocultural factors enable teaching and learning to develop innovation leadership skills regarding <i>Innovative Thinking in Demonstrating curiosity</i> (.341)</p> <p>O436 Sociocultural factors enable teaching and learning to develop innovation leadership skills regarding <i>Innovative Thinking in Idea championing</i> (.345)</p> <p>O437 Sociocultural factors enable teaching and</p>	

Opportunities-O (PNI _{modified})	Threats-T (PNI _{modified})
<p>learning to develop innovation leadership skills regarding <i>Innovative Thinking in Developing Empathy for others</i> (.347)</p> <p>O438 Sociocultural factors enable teaching and learning to develop innovation leadership skills regarding <i>Innovation Recognition and Support in Recognizing the innovators</i> (.347)</p> <p>O439 Sociocultural factors enable teaching and learning to develop innovation leadership skills regarding <i>Innovative Thinking in Assaulting assumptions</i> (.348)</p> <p>O4310 Sociocultural factors enable teaching and learning to develop innovation leadership skills regarding <i>Innovative Thinking in Opportunity exploration</i> (.351)</p>	

Table 40

TOWS Matrix of Academic Management of Secondary Schools Based on the Concept of Innovation Leadership Skills Regarding Curriculum Development

Academic Management of Secondary Schools Based on the Concept of Innovation Leadership Skills	TOWS Matrix
Curriculum Development	Strength-Opportunity (SO) Aggressive Strategy
	<p>S101 Political-legal factors enable curriculum development to develop innovation leadership skills regarding:</p> <p>S110111 Innovation Recognition and Support regarding <i>Leading by example</i> (.281)</p> <p>S120114 Innovation Recognition and Support regarding <i>Leading courageously</i> (.285)</p> <p>S140112 Innovation Recognition and Support regarding <i>Promoting a culture of trust</i> (.294)</p> <p>S150113 Innovative Thinking regarding <i>Idea championing</i> (.297)</p>
	<p>S102 Economic factors enable curriculum development to develop innovation leadership skills regarding:</p> <p>S110213 Innovation Recognition and Support regarding <i>Leading by example</i> (.281)</p> <p>S120212 Innovation Recognition and Support regarding <i>Leading courageously</i> (.285)</p> <p>S130211 Innovative Thinking regarding <i>Demonstrating curiosity</i> (.287)</p> <p>S140218 Innovation Recognition and Support</p>

Academic Management of Secondary Schools Based on the Concept of Innovation Leadership Skills	TOWS Matrix
	regarding Promoting a culture of trust (.294) S15O215 Innovative Thinking regarding Idea championing (.297) S16O2110 Innovative Thinking regarding Proactive thinking (.302) S17O216 Innovative Thinking regarding Idea generation (.309)
	S1O3 Technological factors enable measurement and evaluation to develop innovation leadership skills regarding: S11 Innovation Recognition and Support regarding Leading by example (.281) S12 Innovation Recognition and Support regarding Leading courageously (.285) S13 Innovative Thinking regarding Demonstrating curiosity (.287) S14 Innovation Recognition and Support regarding Promoting a culture of trust (.294) S15 Innovative Thinking regarding Idea championing (.297) S17 Innovative Thinking regarding Idea generation (.309)
	S1O4 Sociocultural factors enable curriculum development to develop innovation leadership skills regarding: S11O412 Innovation Recognition and Support regarding Leading by example (.281) S12O411 Innovation Recognition and Support regarding Leading courageously (.285) S13O414 Innovative Thinking regarding Demonstrating curiosity (.287) S14O413 Innovation Recognition and Support regarding Promoting a culture of trust (.294) S15O416 Innovative Thinking regarding Idea championing (.297) S16O4112 Innovative Thinking regarding Proactive thinking (.302) S17O419 Innovative Thinking regarding Idea generation (.309)
	Strength-Threats (ST): Diversification Strategy
	S1T2 Technological factors are a threat to curriculum development in developing innovation leadership skills regarding: S1T224 Innovative Thinking regarding Proactive thinking (.302)
	S1T4 Political-legal factors are a threat to curriculum

Academic Management of Secondary Schools Based on the Concept of Innovation Leadership Skills	TOWS Matrix
	development in developing innovation leadership skills regarding: S1T438 Innovative Thinking regarding Demonstrating curiosity (.287) S1T439 Innovative Thinking regarding Idea generation (.309)
	Weakness-Opportunity (WO): Turnaround Strategy
	W301 Political-legal factors enable curriculum development to develop innovation leadership skills regarding: W37 Innovative Thinking regarding Assaulting assumptions (.328)
	W302 Economic factors enable curriculum development to develop innovation leadership skills regarding: W32 Innovation Vision and Strategy regarding Strategic thinking(.358) W36 Innovative Thinking regarding Idea application (.331) W37 Innovative Thinking regarding Assaulting assumptions (.328) W38 Innovative Thinking regarding Developing Empathy for others (.327)
	W303 Technological factors enable measurement and evaluation to develop innovation leadership skills regarding: W32 Innovation Vision and Strategy regarding Strategic thinking(.358) W33 Innovation Vision and Strategy regarding Managing risk (.338)
	W304 Sociocultural factors enable curriculum development to develop innovation leadership skills regarding: W33 Innovation Vision and Strategy regarding Managing risk (.338) W34 Innovation Recognition and Support Recognizing the innovators (.333) W35 Innovative Thinking regarding Opportunity exploration (.332) W36 Innovative Thinking regarding Idea application (.331) W37 Innovative Thinking regarding Assaulting assumptions (.328)
	Weaknesses-Threat (WT) Defensive Strategy
	W3T1 Sociocultural factors are a threat to

Academic Management of Secondary Schools Based on the Concept of Innovation Leadership Skills	TOWS Matrix
	<p>curriculum development in developing innovation leadership skills regarding:</p> <p>W31 Innovation Vision and Strategy regarding Realizing innovation vision (.368)</p> <p>W32 Innovation Vision and Strategy regarding Strategic thinking(.358)</p> <p>W38 Innovative Thinking regarding Developing Empathy for others (.327)</p>
	<p>W3T2 Technological factors are a threat to curriculum development in developing innovation leadership skills regarding:</p> <p>W31 Curriculum development in developing Innovation Vision and Strategy regarding Realizing innovation vision (.368)</p> <p>W34 Curriculum development in developing Innovation Recognition and Support Recognizing the innovators (.333)</p> <p>W35 Curriculum development in developing Innovative Thinking regarding Opportunity exploration (.332)</p> <p>W36 Innovative Thinking regarding Idea application (.331)</p> <p>W37 Curriculum development in developing Innovative Thinking regarding Assaulting assumptions (.328)</p> <p>W38 Curriculum development in developing Innovative Thinking regarding Developing Empathy for others (.327)</p>
	<p>W3T3 Economic factors are a threat to curriculum development in developing innovation leadership skills regarding:</p> <p>W31 Curriculum development in developing Innovation Vision and Strategy regarding Realizing innovation vision (.368)</p> <p>W33 Curriculum development in developing Innovation Vision and Strategy regarding Managing risk (.338)</p> <p>W34 Curriculum development in developing Innovation Recognition and Support Recognizing the innovators (.333)</p> <p>W35 Curriculum development in developing Innovative Thinking regarding Opportunity exploration (.332)</p>
	<p>W3T4 Political-legal factors are a threat to curriculum development in developing innovation leadership skills regarding:</p>

Academic Management of Secondary Schools Based on the Concept of Innovation Leadership Skills	TOWS Matrix
	<p>W31 Curriculum development in developing Innovation Vision and Strategy regarding Realizing innovation vision (.368)</p> <p>W32 Curriculum development in developing Innovation Vision and Strategy regarding Strategic thinking (.358)</p> <p>W33 Curriculum development in developing Innovation Vision and Strategy regarding Managing risk (.338)</p> <p>W34 Curriculum development in developing Innovation Recognition and Support Recognizing the innovators (.333)</p> <p>W35 Curriculum development in developing Innovative Thinking regarding Opportunity exploration (.332)</p> <p>W36 Innovative Thinking regarding Idea application (.331)</p> <p>W38 Curriculum development in developing Innovative Thinking regarding Developing Empathy for others (.327)</p>

Table 41

TOWS Matrix of Academic Management of Secondary Schools Based on the Concept of Innovation Leadership Skills Regarding Measurement and Evaluation

Academic Management of Secondary Schools Based on the Concept of Innovation Leadership Skills	TOWS Matrix
Measurement and evaluation	Strength-Opportunity (SO) Aggressive Strategy
	<p>S2O1 Political-legal factors enable measurement and evaluation to develop innovation leadership skills regarding:</p> <p>S21 Measurement and evaluation in developing Innovation Recognition and Support regarding Leading by example (.303)</p> <p>S22 Measurement and evaluation in developing Innovation Recognition and Support regarding Leading courageously (.308)</p> <p>S23 Measurement and evaluation in developing Innovation Recognition and Support regarding Promoting a culture of trust (.318)</p> <p>S24 Measurement and evaluation in developing Innovative Thinking regarding Idea championing</p>

Academic Management of Secondary Schools Based on the Concept of Innovation Leadership Skills	TOWS Matrix
	<p>(.319) S25 Measurement and evaluation in developing Innovative Thinking regarding Demonstrating curiosity (.321) S26 Measurement and evaluation in developing Innovative Thinking regarding Assaulting assumptions (.325) S29 Measurement and evaluation in developing Innovative Thinking regarding Proactive thinking (.331)</p>
	<p>S2O2 Economic factors enable measurement and evaluation to develop innovation leadership skills regarding: S21 Measurement and evaluation in developing Innovation Recognition and Support regarding Leading by example (.303) S22 Measurement and evaluation in developing Innovation Recognition and Support regarding Leading courageously (.308) S23 Measurement and evaluation in developing Innovation Recognition and Support regarding Promoting a culture of trust (.318) S24 Measurement and evaluation in developing Innovative Thinking regarding Idea championing (.319) S25 Measurement and evaluation in developing Innovative Thinking regarding Demonstrating curiosity (.321) S26 Measurement and evaluation in developing Innovative Thinking regarding Assaulting assumptions (.325) S27 Measurement and evaluation in developing Innovation Recognition and Support regarding Recognizing the innovators (.326) S28 Measurement and evaluation in developing Innovative Thinking regarding Idea generation (.330) S29 Measurement and evaluation in developing Innovative Thinking regarding Proactive thinking (.331) S210 Measurement and evaluation in developing Innovative Thinking regarding Idea application (.336)</p>
	<p>S2O3 Technological factors enable measurement and evaluation to develop innovation leadership skills regarding: S22 Measurement and evaluation in developing Innovation Recognition and Support regarding</p>

Academic Management of Secondary Schools Based on the Concept of Innovation Leadership Skills	TOWS Matrix
	<p>Leading courageously (.308)</p> <p>S23 Measurement and evaluation in developing Innovation Recognition and Support regarding Promoting a culture of trust (.318)</p> <p>S24 Measurement and evaluation in developing Innovative Thinking regarding Idea championing (.319)</p> <p>S25 Measurement and evaluation in developing Innovative Thinking regarding Demonstrating curiosity (.321)</p> <p>S26 Measurement and evaluation in developing Innovative Thinking regarding Assaulting assumptions (.325)</p> <p>S27 Measurement and evaluation in developing Innovation Recognition and Support regarding Recognizing the innovators (.326)</p> <p>S28 Measurement and evaluation in developing Innovative Thinking regarding Idea generation (.330)</p> <p>S29 Measurement and evaluation in developing Innovative Thinking regarding Proactive thinking (.331)</p>
	<p>S2O4 Sociocultural factors enable measurement and evaluation to develop innovation leadership skills regarding:</p> <p>S21 Measurement and evaluation in developing Innovation Recognition and Support regarding Leading by example (.303)</p> <p>S22 Measurement and evaluation in developing Innovation Recognition and Support regarding Leading courageously (.308)</p> <p>S23 Measurement and evaluation in developing Innovation Recognition and Support regarding Promoting a culture of trust (.318)</p> <p>S24 Measurement and evaluation in developing Innovative Thinking regarding Idea championing (.319)</p> <p>S25 Measurement and evaluation in developing Innovative Thinking regarding Demonstrating curiosity (.321)</p> <p>S28 Measurement and evaluation in developing Innovative Thinking regarding Idea generation (.330)</p>
	<p>Strength-Threat (ST): Diversification Strategy</p>
	<p>S2T1 Sociocultural factors are a threat to measurement and evaluation in developing innovation leadership skills regarding:</p> <p>S26 Measurement and evaluation in developing</p>

Academic Management of Secondary Schools Based on the Concept of Innovation Leadership Skills	TOWS Matrix
	<p>Innovative Thinking regarding Assaulting assumptions (.325)</p> <p>S27 Measurement and evaluation in developing Innovation Recognition and Support regarding Recognizing the innovators (.326)</p> <p>S29 Measurement and evaluation in developing Innovative Thinking regarding Proactive thinking (.331)</p> <p>S210 Measurement and evaluation in developing Innovative Thinking regarding Idea application (.336)</p> <p>S211 Measurement and evaluation in developing Innovative Thinking regarding Opportunity exploration (.339)</p>
	<p>S2T2 Technological factors are a threat to measurement and evaluation in developing innovation leadership skills regarding:</p> <p>S210 Measurement and evaluation in developing Innovative Thinking regarding Idea application (.336)</p> <p>S211 Measurement and evaluation in developing Innovative Thinking regarding Opportunity exploration (.339)</p>
	<p>S2T3 Economic factors are a threat to teaching and learning in developing innovation leadership skills regarding:</p> <p>S26 Measurement and evaluation in developing Innovative Thinking regarding Assaulting assumptions (.325)</p> <p>S27 Measurement and evaluation in developing Innovation Recognition and Support regarding Recognizing the innovators (.326)</p> <p>S28 Measurement and evaluation in developing Innovative Thinking regarding Idea generation (.330)</p> <p>S29 Measurement and evaluation in developing Innovative Thinking regarding Proactive thinking (.331)</p> <p>S210 Measurement and evaluation in developing Innovative Thinking regarding Idea application (.336)</p>
	<p>S2T4 Political-legal factors are a threat to measurement and evaluation in developing innovation leadership skills regarding:</p> <p>S27 Measurement and evaluation in developing Innovation Recognition and Support regarding Recognizing the innovators (.326)</p> <p>S210 Measurement and evaluation in developing Innovative Thinking regarding Idea application (.336)</p> <p>S211 Measurement and evaluation in developing</p>

Academic Management of Secondary Schools Based on the Concept of Innovation Leadership Skills	TOWS Matrix
	Innovative Thinking regarding Opportunity exploration (.339)
	Weakness-Threat (WT): Defensive Strategy
	<p>W2T1 Sociocultural factors are a threat to measurement and evaluation in developing innovation leadership skills regarding:</p> <p>W21 Measurement and evaluation in developing Innovation Vision and Strategy regarding Realizing innovation vision (.379)</p> <p>W24 Measurement and evaluation in developing Innovative Thinking regarding Developing Empathy for others (.344)</p>
	<p>W2T2 Technological factors are a threat to measurement and evaluation in developing innovation leadership skills regarding:</p> <p>W21 Measurement and evaluation in developing Innovation Vision and Strategy regarding Realizing innovation vision (.379)</p> <p>W22 Measurement and evaluation in developing Innovation Vision and Strategy regarding Strategic thinking (.366)</p> <p>W23 Measurement and evaluation in developing Innovation Vision and Strategy regarding Managing risk (.350)</p> <p>W24 Measurement and evaluation in developing Innovative Thinking regarding Developing Empathy for others (.344)</p>
	<p>W2T3 Economic factors are a threat to teaching and learning in developing innovation leadership skills regarding:</p> <p>W21 Measurement and evaluation in developing Innovation Vision and Strategy regarding Realizing innovation vision (.379)</p> <p>W22 Measurement and evaluation in developing Innovation Vision and Strategy regarding Strategic thinking (.366)</p> <p>W23 Measurement and evaluation in developing Innovation Vision and Strategy regarding Managing risk (.350)</p> <p>W24 Measurement and evaluation in developing Innovative Thinking regarding Developing Empathy for others (.344)</p>
	<p>W2T4 Political-legal factors are a threat to measurement and evaluation in developing innovation leadership skills regarding:</p> <p>W21 Measurement and evaluation in developing</p>

Academic Management of Secondary Schools Based on the Concept of Innovation Leadership Skills	TOWS Matrix
	<p>Innovation Vision and Strategy regarding Realizing innovation vision (.379)</p> <p>W22 Measurement and evaluation in developing Innovation Vision and Strategy regarding Strategic thinking (.366)</p> <p>W23 Measurement and evaluation in developing Innovation Vision and Strategy regarding Managing risk (.350)</p> <p>W24 Measurement and evaluation in developing Innovative Thinking regarding Developing Empathy for others (.344)</p>

Table 42

TOWS Matrix of Academic Management of Secondary Schools Based on the Concept of Innovation Leadership Skills Regarding Teaching and Learning

Academic Management of Secondary Schools Based on the Concept of Innovation Leadership Skills	TOWS Matrix
Teaching and Learning	Strength-Opportunity (SO) Aggressive Strategy
	<p>S301 Political-legal factors enable measurement and evaluation to develop innovation leadership skills regarding:</p> <p>S31 Innovation Recognition and Support regarding Promoting a culture of trust (0.311)</p> <p>S32 Innovation Recognition and Support regarding Leading by example (.307)</p> <p>S33 Innovation Recognition and Support regarding Leading courageously (.303)</p> <p>S3-4 Innovative Thinking regarding Demonstrating curiosity (.318)</p> <p>S35 Innovative Thinking regarding Idea application (.332)</p> <p>S36 Innovative Thinking regarding Idea generation (.321)</p> <p>S37 Innovative Thinking regarding Idea championing (.320)</p> <p>S38 Innovation Recognition and Support regarding Recognizing the innovators (.337)</p> <p>S39 Innovative Thinking regarding Assaulting assumptions (.340)</p> <p>S310 Innovative Thinking regarding Proactive</p>

Academic Management of Secondary Schools Based on the Concept of Innovation Leadership Skills	TOWS Matrix
	thinking (.339)
	<p>S3O2 Economic factors enable teaching and learning to develop innovation leadership skills regarding:</p> <p>S31 Innovation Recognition and Support regarding Promoting a culture of trust (0.311)</p> <p>S32 Innovation Recognition and Support regarding Leading by example (.307)</p> <p>S33 Innovation Recognition and Support regarding Leading courageously (.303)</p> <p>S3-4 Innovative Thinking regarding Demonstrating curiosity (.318)</p>
	<p>S3O3 Technological factors enable teaching and learning to develop innovation leadership skills regarding:</p> <p>S31 Innovation Recognition and Support regarding Promoting a culture of trust (0.311)</p> <p>S32 Innovation Recognition and Support regarding Leading by example (.307)</p> <p>S33 Innovation Recognition and Support regarding Leading courageously (.303)</p> <p>S3-4 Innovative Thinking regarding Demonstrating curiosity (.318)</p> <p>S36 Innovative Thinking regarding Idea generation (.321)</p> <p>S37 Innovative Thinking regarding Idea championing (.320)</p> <p>S39 Innovative Thinking regarding Assaulting assumptions (.340)</p>
	<p>S3O4 Sociocultural factors enable teaching and learning to develop innovation leadership skills regarding:</p> <p>S31 Innovation Recognition and Support regarding Promoting a culture of trust (0.311)</p> <p>S32 Innovation Recognition and Support regarding Leading by example (.307)</p> <p>S33 Innovation Recognition and Support regarding Leading courageously (.303)</p> <p>S3-4 Innovative Thinking regarding Demonstrating curiosity (.318)</p> <p>S36 Innovative Thinking regarding Idea generation (.321)</p> <p>S37 Innovative Thinking regarding Idea championing (.320)</p> <p>S38 Innovation Recognition and Support regarding Recognizing the innovators (.337)</p> <p>S39 Innovative Thinking regarding Assaulting</p>

Academic Management of Secondary Schools Based on the Concept of Innovation Leadership Skills	TOWS Matrix
	assumptions (.340)
	Strength-Threat (ST): Diversification Strategy
	<p>S3T1 Sociocultural factors are a threat to teaching and learning in developing innovation leadership skills regarding:</p> <p>S35 Innovative Thinking regarding Idea application (.332)</p> <p>S310 Innovative Thinking regarding Proactive thinking (.339)</p>
	<p>S3T2 Technological factors are a threat to teaching and learning in developing innovation leadership skills regarding:</p> <p>S35 Innovative Thinking regarding Idea application (.332)</p> <p>S38 Innovation Recognition and Support regarding Recognizing the innovators (.337)</p> <p>S310 Innovative Thinking regarding Proactive thinking (.339)</p>
	<p>S3T3 Economic factors are a threat to teaching and learning in developing innovation leadership skills regarding:</p> <p>S35 Innovative Thinking regarding Idea application (.332)</p> <p>S36 Innovative Thinking regarding Idea generation (.321)</p> <p>S37 Innovative Thinking regarding Idea championing (.320)</p> <p>S38 Innovation Recognition and Support regarding Recognizing the innovators (.337)</p> <p>S39 Innovative Thinking regarding Assaulting assumptions (.340)</p> <p>S310 Innovative Thinking regarding Proactive thinking (.339)</p>
	Weakness-Opportunity (WO): Turnaround Strategy
	<p>W101 Political-legal factors enable teaching and learning to develop innovation leadership skills regarding:</p> <p>W15 Innovative Thinking regarding Opportunity exploration (.342)</p>
	<p>W102 Economic factors enable teaching and learning to develop innovation leadership skills regarding:</p> <p>W15 Innovative Thinking regarding Opportunity exploration (.342)</p>
	W103 Technological factors enable teaching and

Academic Management of Secondary Schools Based on the Concept of Innovation Leadership Skills	TOWS Matrix
	learning to develop innovation leadership skills regarding: W12 Innovation Vision and Strategy regarding Managing risk (.359)
	W104 Sociocultural factors enable teaching and learning to develop innovation leadership skills regarding: W14 Innovative Thinking regarding Developing Empathy for others (.346) W15 Innovative Thinking regarding Opportunity exploration (.342)
	Weakness-Threat (WT): Defensive Strategy
	W1T1 Sociocultural factors are a threat to teaching and learning in developing innovation leadership skills regarding: W11 Innovation Vision and Strategy regarding Realizing innovation vision (.379) W12 Innovation Vision and Strategy regarding Managing risk (.359) W13 Innovation Vision and Strategy regarding Strategic thinking (.352)
	W1T2 Technological factors are a threat to teaching and learning in developing innovation leadership skills regarding: W11 Innovation Vision and Strategy regarding Realizing innovation vision (.379) W13 Innovation Vision and Strategy regarding Strategic thinking (.352) W14 Innovative Thinking regarding Developing Empathy for others (.346) W15 Innovative Thinking regarding Opportunity exploration (.342)
	W1T3 Economic factors are a threat to teaching and learning in developing innovation leadership skills regarding: W11 Innovation Vision and Strategy regarding Realizing innovation vision (.379) W12 Innovation Vision and Strategy regarding Managing risk (.359) W13 Innovation Vision and Strategy regarding Strategic thinking (.352) W14 Innovative Thinking regarding Developing Empathy for others (.346)
	W1T4 Political-legal factors are a threat to teaching and learning in developing innovation leadership skills regarding:

Academic Management of Secondary Schools Based on the Concept of Innovation Leadership Skills	TOWS Matrix
	W11 Innovation Vision and Strategy regarding Realizing innovation vision (.379) W12 Innovation Vision and Strategy regarding Managing risk (.359) W13 Innovation Vision and Strategy regarding Strategic thinking (.352) W14 Innovative Thinking regarding Developing Empathy for others (.346)

Table 43

A Summary of TOWS Matrix of Academic Management of Secondary Schools Based on the Concept of Innovation Leadership Skills

Academic Management of Secondary Schools Based on the Concept of Innovation Leadership Skills	Political-Legal (P)	Economic (E)	Sociocultural (S)	Technological (T)
Curriculum Development	SO	SO	ST	ST
<i>1. Innovation Vision and Strategy</i>	WT	WT	WT	WT
1.1 Realizing innovation vision	WT	WT	WT	WT
1.2 Strategic thinking	WT	WO	WT	WO
1.3 Managing risk	WT	WT	WO	WO
<i>2. Innovative Thinking</i>	SO	SO	SO	ST
2.1 Demonstrating curiosity	ST	SO	SO	SO
2.2 Developing Empathy for others	WT	WO	WT	WT
2.3 Opportunity exploration	WT	WT	WO	WT
2.4 Assaulting assumptions	WO	WO	WO	WT
2.5 Proactive thinking	ST	SO	SO	ST
2.6 Idea generation	ST	SO	SO	SO
2.7 Idea championing	SO	SO	SO	SO
2.8 Idea application	ST	SO	SO	ST
<i>3. Innovation Recognition and Support</i>	SO	SO	ST	SO
3.1 Leading courageously	SO	SO	SO	SO
3.2 Leading by example	SO	SO	SO	SO
3.3 Promoting a culture of trust	SO	SO	SO	SO
3.4 Recognizing the innovators	WT	WO	WO	WT
Teaching and Learning	WO	WT	WT	WT
<i>1. Innovation Vision and Strategy</i>	WT	WT	WT	WT
1.1 Realizing innovation vision	WT	WT	WT	WT
1.2 Strategic thinking	WT	WT	WT	WT

Academic Management of Secondary Schools Based on the Concept of Innovation Leadership Skills	Political-Legal (P)	Economic (E)	Sociocultural (S)	Technological (T)
1.3 Managing risk	WT	WT	WT	WO
<i>2. Innovative Thinking</i>	ST	SO	SO	ST
2.1 Demonstrating curiosity	SO	SO	SO	SO
2.2 Developing Empathy for others	WT	WT	WO	WT
2.3 Opportunity exploration	WO	WO	WO	WT
2.4 Assaulting assumptions	SO	ST	SO	SO
2.5 Proactive thinking	SO	ST	ST	ST
2.6 Idea generation	SO	ST	SO	SO
2.7 Idea championing	SO	ST	SO	SO
2.8 Idea application	SO	ST	ST	ST
<i>3. Innovation Recognition and Support</i>	SO	SO	SO	SO
3.1 Leading courageously	SO	SO	SO	SO
3.2 Leading by example	SO	SO	SO	SO
3.3 Promoting a culture of trust	SO	SO	SO	SO
3.4 Recognizing the innovators	SO	ST	SO	ST
Measurement and Evaluation	WT	WT	WO	WO
<i>1. Innovation Vision and Strategy</i>	WT	WT	WT	WT
1.1 Realizing innovation vision	WT	WT	WT	WT
1.2 Strategic thinking	WT	WT	WT	WT
1.3 Managing risk	WT	WT	WT	WT
<i>2. Innovative Thinking</i>	SO	SO	SO	ST
2.1 Demonstrating curiosity	SO	SO	SO	SO
2.2 Developing Empathy for others	WT	WT	WO	WT
2.3 Opportunity exploration	ST	ST	SO	ST
2.4 Assaulting assumptions	SO	SO	SO	SO
2.5 Proactive thinking	SO	SO	ST	SO
2.6 Idea generation	SO	SO	SO	SO
2.7 Idea championing	SO	SO	SO	SO
2.8 Idea application	ST	SO	ST	ST
<i>3. Innovation Recognition and Support</i>	SO	SO	SO	SO
3.1 Leading courageously	SO	SO	SO	SO
3.2 Leading by example	SO	SO	SO	SO
3.3 Promoting a culture of trust	SO	SO	SO	SO
3.4 Recognizing the innovators	ST	SO	SO	SO

As shown in Table 43, the highlighted were taken into developing strategies and substrategies in the next section. They were chosen because of the lowest PNI_{modified} of opportunity (O) and the highest PNI_{modified} of threat (T). The WT

strategy was not selected since it was not prominent and just a defensive strategy.

Table 44 provides a TOWS matrix of selected matches for developing substrategies.

Table 44

A Summary of Selected TOWS Matrix in Developing Strategies

<p>Internal environment</p> <p>External environment</p>	<p>Strengths (S)</p> <p>S1: Curriculum development regarding identifying student learning outcomes in the curriculum [.310 (5)]</p> <p>S2: Curriculum development regarding using student learning outcomes in subject development [.324 (4)]</p>	<p>Weaknesses (W)</p> <p>W1: Teaching and learning regarding using learning media and resources [.334 (1)]</p> <p>W2: Teaching and learning regarding using organizing learning activities [.332 (3)]</p> <p>W3: Measurement and evaluation regarding measuring and evaluating student learning outcomes [.332 (2)]</p>
<p>Opportunities (O)</p> <p>O11: Political-legal factors enable curriculum development to develop student innovation leadership skills [.330 (4)]</p> <p>O12: Political-legal factors enable teaching and learning to develop student innovation leadership skills [.333 (4)]</p> <p>O13: Technological factors enable measurement and evaluation to develop student innovation leadership skills [.343 (4)]</p>	<p>SO: Aggressive Strategies (Maximize)</p> <p>S1O11: Redesign learning outcomes in innovation leadership skills regarding Innovation Vision and Strategy Innovation Recognition and Support, and Innovative Thinking.</p>	<p>WO: Turnaround Strategies (Remediate/ Ignore)</p> <p>W2O12: Transform in-classroom and out-classroom learning activities to develop student innovation leadership skills focusing on innovation vision and strategy, innovative thinking, and innovation recognition and support.</p> <p>W1O12: Develop learning media and resources to develop student innovation leadership skills focusing on innovation vision and strategy, innovative thinking, and innovation recognition and support.</p>
<p>Threats (T)</p> <p>T13: Sociocultural factors enable curriculum development to develop student innovation leadership skills [.330 (1)]</p>	<p>ST: Diversification Strategies (Deflect/ Reduce)</p> <p>S2T13: Promote the use of learning outcomes in subject development related to innovation leadership skills regarding Innovation Vision and Strategy, Innovation Recognition and Support, and Innovative Thinking.</p>	<p>W3O13: Develop measurement and evaluation tools on student learning outcomes set in the curriculum related to innovation leadership skills focusing on innovation vision and strategy, innovative thinking, and innovation recognition and support.</p> <p>W3O13: Promote assessment of student learning outcomes in innovation leadership skills focusing on innovation vision and strategy, innovative thinking, and innovation recognition and support.</p>

Note. [.330 (1)] = [PNI_{modified}(Ranking)]

4.4.1 Academic Management Strategies of Secondary Schools Based on the Concept of Innovation Leadership Skills (First Draft)

Secondary schools' academic management strategies based on the concept of innovation leadership skills (first draft) were developed based on the results of data analysis from Phase I, Phase II and Phase III, using the findings of SWOT associated with PNI_{modified} in developing the strategies, substrategies and procedures as follows.

1) Develop strategies from the conceptual frameworks for academic management of secondary schools based on the concept of innovation leadership skills, consisting of curriculum development, teaching and learning, and measurement and evaluation.

2) Develop substrategies from the conceptual frameworks for academic management of secondary schools based on the concept of innovation leadership skills by sorting the PNI_{modified} from the highest to the lowest to select components and subcomponents of innovation leadership skills that are weaknesses, which need to be developed first, and top three lowest levels of students' innovation leadership skills. (Table 15, 36, 37, and 43)

3) Develop procedures from the results of the internal environment and the external environment analysis and the content analysis of open-ended question answers in the questionnaire and literature. (Table 15, 36, 37, and 43)

Strategies, substrategies, and procedures were developed based on the principles above, as shown in Table 45.

Table 45

Academic Management Strategy of Secondary Schools Based on the Concept of Innovation Leadership Skills (First Draft)

Strategies	Substrategies	Procedures
1. Redesign the curriculum to develop student innovation leadership skills (PNI _{modified} = .317/S) (SO/ST)	<p>1.1 Redesign learning outcomes in innovation leadership skills regarding innovation vision and strategy, innovation recognition and support, and innovative thinking. (S1O11)</p> <p><u>Innovation Vision and Strategy</u> Realizing innovation vision (.368) Strategic thinking (.358) Managing risk (.338)</p> <p><u>Innovation Recognition and Support</u> Recognizing the innovators (.333) Leading courageously ($M = 3.57$)</p> <p><u>Innovative Thinking</u> Opportunity exploration (.332) Idea application (.331) ($M = 3.57$) Assaulting assumptions (.328) Idea championing ($M = 3.32$) Developing Empathy for others (.327)</p>	<p>1.1.1 Form a committee for curriculum development that include both internal and external stakeholders.</p> <p>1.1.2 Design innovation hub curriculum and interdisciplinary curriculum for creating young innovation leaders who are supposed to have skills of Innovation Vision and Strategy, Innovation Recognition and Support, and Innovative Thinking.</p> <p>1.1.3 Conduct workshops on new curricular (i.e., innovation hub curriculum and interdisciplinary curriculum) for all stakeholders before implementation to avoid misunderstanding.</p> <p>1.1.4 Monitor and evaluate the curriculum implementation.</p>
	<p>1.2 Promote the use of learning outcomes in subject development related to innovation leadership skills regarding innovation vision and strategy, innovation recognition and support, and innovative thinking. (S2T13)</p> <p><u>Innovation Vision and Strategy</u> Realizing innovation vision (.368) Strategic thinking (.358) Managing risk (.338)</p> <p><u>Innovation Recognition and Support</u> Recognizing the innovators (.333) Leading courageously ($M = 3.57$)</p> <p><u>Innovative Thinking</u> Opportunity exploration (.332) Idea application (.331) ($M = 3.57$) Assaulting assumptions (.328) Idea Championing ($M = 3.32$) Developing Empathy for others</p>	<p>1.2.1 Integrate learning outcomes related to student innovation leadership skills regarding Innovation Recognition and Support, Innovative Thinking, and Innovation Vision and Strategy into the subjects in the curriculum.</p> <p>1.2.2 Open elective subjects with the content of student innovation leadership skills regarding Innovation Recognition and Support, Innovative Thinking, and Innovation Vision and Strategy.</p> <p>1.2.3 Evaluate learning outcomes of each subject related to student innovation leadership skills regarding Innovation Recognition and Support, Innovative Thinking, and Innovation Vision and Strategy that students have acquired through those subjects.</p>

Strategies	Substrategies	Procedures
<p>2. Transform teaching and learning to develop student innovation leadership skills (PNI_{modified} = .333/W) (WO)</p>	<p>(.327)</p> <p>2.1 Transform in-classroom and out-classroom learning activities to develop student innovation leadership skills focusing on innovation vision and strategy, innovative thinking, and innovation recognition and support. (W2O12)</p> <p><u>Innovation Vision and Strategy</u> Realizing innovation vision (.379) Managing risk (.359) Strategic thinking (.352)</p> <p><u>Innovative Thinking</u> Developing Empathy for others (.346) Opportunity exploration (.342) Idea Championing (<i>M</i> = 3.32) Idea Application (<i>M</i> = 3.57)</p> <p><u>Innovation Recognition and Support</u> Leading courageously (<i>M</i> = 3.57)</p>	<p>2.1.1 Conduct training and development programs for teachers on new teaching methods focusing on experiential learning.</p> <p>2.1.2 Design classroom learning activities including problem-based learning, project-based learning, collaborative learning or cooperative learning, service learning, and hands-on learning and extracurricular activities focusing on innovation and leadership, including competitions (e.g., project work), events of networking and invitation of guest speakers, and seminars and workshops emphasizing desired learning outcomes regarding innovation vision and strategy, innovative thinking, and innovation recognition and support.</p> <p>2.1.3 Engage local businesses and organizations as well as community in the learning process, such as project-based learning and workshops and seminars to give students opportunities for working out the real-world problems.</p> <p>2.1.4 Monitor and evaluate the implementation of classroom learning activities and extracurricular activities using key performance indicators (KPI).</p>
	<p>2.2 Develop learning media and resources to develop student innovation leadership skills focusing on innovation vision and strategy, innovative thinking, and innovation recognition and support. (W1O12)</p> <p><u>Innovation Vision and Strategy</u> Realizing innovation vision (.379) Managing risk (.359) Strategic thinking (.352)</p> <p><u>Innovative Thinking</u> Developing Empathy for others (.346) Opportunity exploration (.342)</p>	<p>2.2.1 Formulate a policy on the use of learning media and resources that encourage teachers to understand and use them effectively.</p> <p>2.2.2 Design learning media and resources that facilitate classroom learning activities and extracurricular activities as well as allow students to work on their own as a self-directed learner and work in a group work, such as a maker space, real-world problem-solving space, and simulation space, with focus on innovation vision and strategy, innovative thinking, and innovation</p>

Strategies	Substrategies	Procedures
	Idea Championing ($M = 3.32$) Idea Application ($M = 3.57$) <u>Innovation Recognition and Support</u> Leading courageously ($M = 3.57$)	recognition and support. 2.2.3 Evaluate the effectiveness of learning media and resources used by teachers and students through, such as a survey and interview on satisfaction and research on causal relationship between learning media and resources and student learning.
3. Improve measurement and evaluation to develop student innovation leadership skills ($PNI_{\text{modified}} = .332/W$) (WO)	3.1 Develop measurement and evaluation tools on student learning outcomes set in the curriculum related to innovation leadership skills focusing on innovation vision and strategy, innovative thinking, and innovation recognition and support. (W3O13) <u>Innovation Vision and Strategy</u> Realizing innovation vision (.379) Strategic thinking(.366) Managing risk (.350) <u>Innovative Thinking</u> Developing Empathy for others (.344) Idea Championing ($M = 3.32$) Idea Application ($M = 3.57$) <u>Innovation Recognition and Support</u> Leading courageously ($M = 3.57$)	3.1.1 Conduct training for teachers about measurement and evaluation techniques, particularly formative and summative evaluation, as well as authentic assessment. 3.1.2 Form a committee for setting a policy on measurement and evaluation on student learning outcomes regarding innovation vision and strategy, innovative thinking, and innovation recognition and support. 3.1.3 Apply assessment for learning (i.e., formative assessment), including self-assessment and peer-assessment and provide creative feedback to improve student learning on a regular basis, such as monthly and mid-semesterly, emphasizing desired learning outcomes regarding innovation vision and strategy, innovative thinking, and innovation recognition and support. 3.1.4 Conduct performance assessment and authentic assessment, such as portfolios, project work, and event performance, with a focus with students' innovation leadership skills regarding innovation vision and strategy, innovative thinking, and innovation recognition and support.
	3.2 Promote assessment of student learning outcomes in innovation leadership skills focusing on innovation vision and strategy, innovative thinking, and innovation recognition and support. (W3O13) <u>Innovation Vision and Strategy</u> Realizing innovation vision (.379) Strategic thinking(.366)	3.2.1 Formulate a policy on measurement and evaluation on subjects that focus on student innovation leadership skills regarding innovation vision and strategy, innovative thinking, and innovation recognition and support. 3.2.2 Use technology in the assessment on student innovation leadership skills regarding innovation

Strategies	Substrategies	Procedures
	Managing risk (.350) <u>Innovative Thinking</u> Developing Empathy for others (.344) Idea Championing ($M = 3.32$) Idea Application ($M = 3.57$) <u>Innovation Recognition and Support</u> Leading courageously ($M = 3.57$)	vision and strategy, innovative thinking, and innovation recognition and support. 3.2.3 Evaluate the assessment process implemented as set in the policy.

4.4.2 Suitability and Feasibility of (First Draft) Academic Management Strategies of Secondary Schools Based on the Concept of Innovation Leadership Skills

Results from the evaluation of the experts on suitability and feasibility of (first draft) academic management strategies of secondary schools based on the concept of innovation leadership skills are shown in Table 46-47.

Table 46

Evaluation Results of (First Draft) Academic Management Strategies and Substrategies of Secondary Schools Based on the Concept of Innovation Leadership Skills

Strategies and Substrategies	Suitability		Feasibility	
	M (SD)	Level	M (SD)	Level
1. Redesign the curriculum to develop student innovation leadership skills	4.56 (0.53)	Highest	4.44 (0.53)	High
1.1 Redesign learning outcomes in innovation leadership skills regarding <i>Innovation Vision and Strategy, Innovation Recognition and Support, and Innovative Thinking.</i>	4.44 (0.88)	High	4.22 (0.83)	High
1.2 Promote the use of learning outcomes in subject development related to innovation leadership skills regarding <i>Innovation Vision and Strategy, Innovation Recognition and Support, and Innovative Thinking.</i>	4.89 (0.33)	Highest	4.44 (0.53)	High
2. Transform teaching and learning to develop student innovation leadership skills	4.67 (0.71)	Highest	4.44 (0.73)	High
2.1 Transform in-classroom and out-classroom learning activities to develop student innovation leadership skills focusing on <i>innovation vision and strategy, innovative thinking, and innovation recognition and support.</i>	4.67 (0.71)	Highest	4.22 (0.83)	High

Strategies and Substrategies	Suitability		Feasibility	
	<i>M</i> (<i>SD</i>)	Level	<i>M</i> (<i>SD</i>)	Level
2.2 Develop learning media and resources to develop student innovation leadership skills focusing on <i>innovation vision and strategy</i> , <i>innovative thinking</i> , and <i>innovation recognition and support</i> .	4.56 (1.01)	Highest	4.33 (0.71)	High
3. Improve measurement and evaluation to develop student innovation leadership skills	4.78 (0.67)	Highest	4.22 (0.67)	High
3.1 Develop measurement and evaluation tools on student learning outcomes set in the curriculum related to innovation leadership skills focusing on <i>innovation vision and strategy</i> , <i>innovative thinking</i> , and <i>innovation recognition and support</i> .	4.89 (0.33)	Highest	4.33 (0.50)	High
3.2 Promote assessment of student learning outcomes in innovation leadership skills focusing on <i>innovation vision and strategy</i> , <i>innovative thinking</i> , and <i>innovation recognition and support</i> .	4.78 (0.67)	Highest	4.33 (0.71)	High

Table 46 shows that mean scores of suitability of all strategies and substrategies were at the highest levels, in the range of 4.44-4.89, except for substrategy 1.1, which was at the high level. Feasibility of all strategies and substrategies were at the high level. Mean scores of the three strategies and six substrategies were between 4.22 and 4.44.

Table 47

Evaluation Results of Procedures of (First Draft) Academic Management Strategies and Substrategies of Secondary Schools Based on the Concept of Innovation Leadership Skills

Procedures	Suitability		Feasibility	
	<i>M</i> (<i>SD</i>)	Level	<i>M</i> (<i>SD</i>)	Level
1. Redesign the curriculum to develop student innovation leadership skills				
1.1 Redesign learning outcomes in innovation leadership skills regarding <i>Innovation Vision and Strategy</i> , <i>Innovation Recognition and Support</i> , and <i>Innovative Thinking</i> .				
1.1.1 Form a committee for curriculum development that include both internal and external stakeholders.	4.78 (0.44)	Highest	4.44 (0.73)	High
1.1.2 Design innovation hub curriculum and interdisciplinary curriculum for creating young innovation leaders who are	4.44 (0.53)	Highest	4.11 (0.78)	High

Procedures	Suitability		Feasibility	
	M (SD)	Level	M (SD)	Level
supposed to have skills of Innovation Recognition and Support, Innovative Thinking, and Innovation Vision and Strategy.				
1.1.3 Conduct workshops on new curricular (i.e., innovation hub curriculum and interdisciplinary curriculum) for all stakeholders before implementation to avoid misunderstanding.	4.78 (0.44)	Highest	4.67 (0.71)	Highest
1.1.4 Monitor and evaluate the curriculum implementation.	4.56 (0.73)	Highest	4.44 (0.88)	High
1.2 Promote the use of learning outcomes in subject development related to innovation leadership skills regarding <i>Innovation Vision and Strategy</i> , <i>Innovation Recognition and Support</i> , and <i>Innovative Thinking</i> .				
1.2.1 Integrate learning outcomes related to student innovation leadership skills regarding Innovation Recognition and Support, Innovative Thinking, and Innovation Vision and Strategy into the subjects in the curriculum.	4.56 (0.53)	Highest	4.33 (0.71)	High
1.2.2 Open elective subjects with the content of student innovation leadership skills regarding Innovation Recognition and Support, Innovative Thinking, and Innovation Vision and Strategy.	4.78 (0.44)	Highest	4.44 (0.88)	High
1.2.3 Evaluate learning outcomes of each subject related to student innovation leadership skills regarding Innovation Recognition and Support, Innovative Thinking, and Innovation Vision and Strategy that students have acquired through those subjects.	4.78 (0.44)	Highest	4.56 (0.73)	Highest
2. Transform teaching and learning to develop student innovation leadership skills				
2.1 Transform in-classroom and out-classroom learning activities to develop student innovation leadership skills focusing on <i>innovation vision and strategy</i> , <i>innovative thinking</i> , and <i>innovation recognition and support</i> .				
2.1.1 Conduct training and development programs for teachers on new teaching methods focusing on experiential learning.	5 (0)	Highest	4.67 (0.50)	Highest
2.1.2 Design classroom learning activities including problem-based learning, project-based learning, collaborative learning or cooperative learning, service learning, and hands-on learning and extracurricular activities focusing on innovation and leadership, including competitions (e.g., project work), events of networking and invitation of guest speakers, and seminars and workshops emphasizing desired learning outcomes regarding innovation vision and strategy, innovative thinking, and innovation recognition and support.	4.67 (0.50)	Highest	4.33 (0.87)	High
2.1.3 Engage local businesses and organizations as well as community in the learning process, such as project-based learning and workshops and seminars to give students	4.56 (0.73)	Highest	4.44 (0.73)	High

Procedures	Suitability		Feasibility	
	M (SD)	Level	M (SD)	Level
opportunities for working out the real-world problems.				
2.1.4 Monitor and evaluate the implementation of classroom learning activities and extracurricular activities using key performance indicators (KPI).	4.89 (0.33)	Highest	4.67 (0.50)	Highest
2.2 Develop learning media and resources to develop student innovation leadership skills focusing on <i>innovation vision and strategy</i> , <i>innovative thinking</i> , and <i>innovation recognition and support</i> .				
2.2.1 Formulate a policy on the use of learning media and resources that encourage teachers to understand and use them effectively.	4.44 (0.53)	Highest	4.33 (0.71)	High
2.2.2 Design learning media and resources that facilitate classroom learning activities and extracurricular activities as well as allow students to work on their own as a self-directed learner and work in a group work, such as a maker space, real-world problem-solving space, and simulation space, with focus on innovation vision and strategy, innovative thinking, and innovation recognition and support.	4.56 (0.73)	Highest	4.44 (0.73)	High
2.2.3 Evaluate the effectiveness of learning media and resources used by teachers and students through, such as a survey and interview on satisfaction and research on causal relationship between learning media and resources and student learning.	4.67 (0.71)	Highest	4.44 (0.88)	High
3. Improve measurement and evaluation to develop student innovation leadership skills				
3.1 Develop measurement and evaluation tools on student learning outcomes set in the curriculum related to innovation leadership skills focusing on <i>innovation vision and strategy</i> , <i>innovative thinking</i> , and <i>innovation recognition and support</i> .				
3.1.1 Conduct training for teachers about measurement and evaluation techniques, particularly formative and summative evaluation, as well as authentic assessment.	4.56 (0.73)	Highest	4.56 (0.73)	Highest
3.1.2 Form a committee for setting a policy on measurement and evaluation on student learning outcomes regarding innovation vision and strategy, innovative thinking, and innovation recognition and support.	4.56 (0.73)	Highest	4.44 (0.73)	High
3.1.3 Apply assessment for learning (i.e., formative assessment), including self-assessment and peer-assessment and provide creative feedback to improve student learning on a regular basis, such as monthly and mid-semesterly, emphasizing desired learning outcomes regarding innovation vision and strategy, innovative thinking, and innovation recognition and support.	4.56 (0.73)	Highest	4.56 (0.73)	Highest
3.1.4 Conduct performance assessment and authentic assessment, such as portfolios, project work, and event performance, with a focus with students' innovation leadership skills regarding innovation vision and strategy, innovative thinking, and innovation recognition and support.	4.56 (0.73)	Highest	4.56 (0.73)	Highest
3.2 Promote assessment of student learning outcomes in innovation leadership skills focusing on <i>innovation vision and strategy</i> , <i>innovative thinking</i> , and <i>innovation recognition and support</i> .				

Procedures	Suitability		Feasibility	
	<i>M</i> (<i>SD</i>)	Level	<i>M</i> (<i>SD</i>)	Level
3.2.1 Formulate a policy on measurement and evaluation on subjects that focus on student innovation leadership skills regarding innovation vision and strategy, innovative thinking, and innovation recognition and support.	4.67 (0.71)	Highest	4.33 (0.87)	High
3.2.2 Use technology in the assessment on student innovation leadership skills regarding innovation vision and strategy, innovative thinking, and innovation recognition and support.	4.56 (1.01)	Highest	4.33 (1.00)	High
3.2.3 Evaluate the assessment process implemented as set in the policy.	4.44 (0.73)	Highest	4.56 (0.73)	Highest

Table 47 shows that regarding suitability, all procedures were at the highest level, except for procedure 1.1.2, 2.2.1, and 3.2.3. Mean scores were in the range of 4.44-5. Regarding feasibility, mean scores of all procedures were between 4.33 and 4.67. All procedures of the substrategy 2.2 regarding learning media and resources were at the high level.

Comments and suggestions of the experts are shown in Table 48.

Table 48

Comments and Suggestions of Experts on Academic Management Strategies of Secondary Schools Based on the Concept of Innovation Leadership Skills (First Draft)

Strategy, Substrategy, and Procedure	Comments or Suggestions
Strategy 1: Redesign the curriculum to develop student innovation leadership skills	
Substrategy 1.1: Redesign learning outcomes in innovation leadership skills regarding <i>Innovation Vision and Strategy, Innovation Recognition and Support, and Innovative Thinking</i> .	-“Expected or desired learning outcomes” may be more appropriate than just “learning outcomes”. - If expected innovation leadership skills (ILS) learning outcomes don’t yet exist, a more suitable act could be “to develop or design” not “to redesign”, or it’d be more suitable to redesign the existing expected learning outcomes across the disciplines of school curriculum to explicitly involve these skills.
1.1.1 Form a committee for curriculum development that include both internal and	-This is supposed to be the responsibility of the ministry.

Strategy, Substrategy, and Procedure	Comments or Suggestions
external stakeholders.	-What do you mean by ‘forming committee for curriculum development?’ Is it at school level, or national level? If at school level, what are the role of the committee?
1.1.2 Design innovation hub curriculum and interdisciplinary curriculum for creating young innovation leaders who are supposed to have skills of <i>Innovation Recognition and Support, Innovative Thinking, and Innovation Vision and Strategy</i> .	-It may be done in rich-resource schools only. -Before this, the school administrators and teachers might need to be familiar with or understand the interdisciplinary curriculum concept and how to develop it from the existing disciplines.
1.1.3 Conduct workshops on new curricular (i.e., innovation hub curriculum and interdisciplinary curriculum) for all stakeholders before implementation to avoid misunderstanding.	-Stakeholder should be carefully selected based on their prior knowledge on new curricular.
1.1.4 Monitor and evaluate the curriculum implementation.	-This overlaps 1.2.3, 2.1.4, 2.2.3, and 3.2.3., as curriculum implementation involves teaching and evaluating processes. -1.1.1 – 1.1.4 here do not clearly focus on “learning outcomes” as stated in this substrategy. - -The word “curriculum development” might be too broad. -You may want to develop ILS expected learning outcomes first, then integrate them into the school curriculum as in 1.2.1.
Substrategy 1.2: Promote the use of learning outcomes in subject development related to innovation leadership skills regarding <i>Innovation Vision and Strategy, Innovation Recognition and Support, and Innovative Thinking</i> .	-Should add one more 1.3. Constantly revise and improve the use of learning outcomes in subject development related to innovation leadership skills regarding <i>Innovation Vision and Strategy, Innovation Recognition and Support, and Innovative Thinking</i> . -By “course”, do you mean “school curriculum” or “subject”? They are courses at different levels
1.2.1 Integrate learning outcomes related to student innovation leadership skills regarding <i>Innovation Recognition and Support, Innovative Thinking, and Innovation Vision and Strategy</i> into the subjects in the curriculum.	-The same question as above. If this for the school level, the role of the management team as implementor, in which they will acquire the curriculum from the national level and integrate those leadership skills into their own school. -I assume the course here is an existing subjects taught at school.
1.2.2 Open elective subjects with the content of student innovation leadership skills regarding <i>Innovation Recognition and Support, Innovative Thinking, and Innovation Vision and Strategy</i> .	-It is questionable whether there is availability of time to offer elective subjects. -MoEYS use preservative Norm in Curriculum Development. -The ILS outcomes designed in Strategy 1.1 could be used in two ways: 1. Integration into existing subjects. 2. Initiation of new subject, which could be elective

Strategy, Substrategy, and Procedure	Comments or Suggestions
	-The act “to develop” elective courses can be added before opening them.
1.2.3 Evaluate learning outcomes of each subject related to student innovation leadership skills regarding <i>Innovation Recognition and Support</i> , <i>Innovative Thinking</i> , and <i>Innovation Vision and Strategy</i> that students have acquired through those subjects.	-Teachers need to be trained on the evaluation mechanism and techniques.
Strategy 2: Transform teaching and learning to develop student innovation leadership skills	-In practice, it would be difficult to transform teaching and learning to develop student innovation leadership skill due to the lack of resources, particularly in the rural schools
Substrategy 2.1: Transform in-classroom and out-classroom learning activities to develop student innovation leadership skills focusing on <i>innovation vision and strategy</i> , <i>innovative thinking</i> , and <i>innovation recognition and support</i> .	
2.1.2 Design classroom learning activities including problem-based learning, project-based learning, collaborative learning or cooperative learning, service learning, and hands-on learning and extracurricular activities focusing on innovation and leadership, including competitions (e.g., project work), events of networking and invitation of guest speakers , and seminars and workshops emphasizing desired learning outcomes regarding <i>innovation vision and strategy</i> , <i>innovative thinking</i> , and <i>innovation recognition and support</i> .	-Not enough budget to run extra activities - Just only these skills? - “including” could be replaced by “based on”
2.1.3 Engage local businesses and organizations as well as community in the learning process, such as project-based learning and workshops and seminars to give students opportunities for working out the real-world problems.	-There have been some cases that local businesses and organizations do not provide such cooperation
Substrategy 2.2: Develop learning media and resources to develop student innovation leadership skills focusing on <i>innovation vision and strategy</i> , <i>innovative thinking</i> , and <i>innovation recognition and support</i> .	
2.2.1 Formulate a policy on the use of learning media and resources that encourage teachers to understand and use them effectively.	-It seems to be redundant as the term “resource” already cover the “media” -Policy at what level? -The policy should specifically related to ILS learning media and resource, not in general. *Policy could also be formulated for learning activity transformation in Substrategy 2.1
2.2.2 Design learning media and resources that facilitate classroom learning activities and extracurricular activities as well as allow	-The concept is good but hard to put into practice

Strategy, Substrategy, and Procedure	Comments or Suggestions
students to work on their own as a self-directed learner and work in a group work, such as a maker space, real-world problem-solving space, and simulation space, with focus on <i>innovation vision and strategy</i> , <i>innovative thinking</i> , and <i>innovation recognition and support</i> .	
2.2.3 Evaluate the effectiveness of learning media and resources used by teachers and students through, such as a survey and interview on satisfaction and research on causal relationship between learning media and resources and student learning.	-Teachers need training and materials
3. Improve measurement and evaluation to develop student innovation leadership skills	
Strategy 3.1: Develop measurement and evaluation tools on student learning outcomes set in the curriculum related to innovation leadership skills focusing on <i>innovation vision and strategy</i> , <i>innovative thinking</i> , and <i>innovation recognition and support</i> .	
3.1.2 Form a committee for setting a policy on measurement and evaluation on student learning outcomes regarding <i>innovation vision and strategy</i> , <i>innovative thinking</i> , and <i>innovation recognition and support</i> .	-To provide ILS assessment guidelines for teachers would also be useful.
3.1.3 Apply assessment for learning (i.e., formative assessment), including self-assessment and peer-assessment and provide creative feedback to improve student learning on a regular basis, such as monthly and mid-semesterly, emphasizing desired learning outcomes regarding <i>innovation vision and strategy</i> , <i>innovative thinking</i> , and <i>innovation recognition and support</i> .	-The substrategy focuses on the ILS assessment tool development. To me, it is not yet in the application or implementation of the tools. -This better be under Substrategy 3.2
3.1.4 Conduct performance assessment and authentic assessment, such as portfolios, project work, and event performance, with a focus with students' innovation leadership skills regarding <i>innovation vision and strategy</i> , <i>innovative thinking</i> , and <i>innovation recognition and support</i> .	-Hard work for MoEYS -This seems to have the same focus as 3.1.3, and better be under Substrategy 3.2 for the same reason as above. -Rather than using, technology could be made ready to support ILS assessment.
Substrategy 3.2: Promote assessment of student learning outcomes in innovation leadership skills focusing on <i>innovation vision and strategy</i> , <i>innovative thinking</i> , and <i>innovation recognition and support</i> .	
3.2.2 Use technology in the assessment on student innovation leadership skills regarding <i>innovation vision and strategy</i> , <i>innovative thinking</i> , and <i>innovation recognition and support</i> .	-Rather than using, technology could be made ready to support ILS assessment.
3.2.3 Evaluate the assessment process implemented as set in the policy.	-This may need to more specific about what sorts of assessment process is being evaluated. The

Strategy, Substrategy, and Procedure	Comments or Suggestions
	teachers' use of ILS assessment or the effectiveness of ILS assessment tools on measuring such student outcomes

4.4.3 Academic Management Strategies of Secondary Schools Based on the Concept of Innovation Leadership Skills (Second Draft)

Based on the comments and recommendations of the experts, the strategies, substrategies, and procedures (second draft) were developed as shown in Table 49.

Table 49

Academic Management Strategy of Secondary Schools Based on the Concept of Innovation Leadership Skills (Second Draft)

Strategies	Substrategies	Procedures
1. Redesign the curriculum to develop student innovation leadership skills (PNI _{modified} = .317/S) (SO/ST)	<p>1.1 Redesign the existing expected learning outcomes with innovation leadership skills regarding Innovation Vision and Strategy Innovation Recognition and Support, and Innovative Thinking across the disciplines of the school curriculum. (S1O11)</p> <p><u>Innovation Vision and Strategy</u> Realizing innovation vision (.368) Strategic thinking (.358) Managing risk (.338)</p> <p><u>Innovation Recognition and Support</u> Recognizing the innovators (.333) Leading courageously ($M = 3.57$)</p> <p><u>Innovative Thinking</u> Opportunity exploration (.332) Idea application (.331) ($M = 3.57$) Assaulting assumptions (.328) Idea championing ($M = 3.32$) Developing empathy for others (.327)</p>	<p>1.1.1 Form a school committee on curriculum development that include both internal and external stakeholders to set school policies and plans on the curriculum that focuses on students' innovation leadership skills regarding Innovation Vision and Strategy Innovation Recognition and Support, and Innovative Thinking.</p> <p>1.1.2 Design innovation hub curriculum and interdisciplinary curriculum for creating young innovation leaders who are supposed to have skills of Innovation Vision and Strategy, Innovation Recognition and Support, and Innovative Thinking.</p> <p>1.1.3 Conduct workshops on new curricular (i.e., innovation hub curriculum and interdisciplinary curriculum) for all stakeholders before implementation to avoid misunderstanding.</p> <p>1.1.4 Monitor and evaluate the implementation of the new curricular.</p>
	1.2 Promote the use of expected	1.2.1 Integrate expected learning

Strategies	Substrategies	Procedures
	<p>learning outcomes in subject development related to innovation leadership skills regarding Innovation Vision and Strategy, Innovation Recognition and Support, and Innovative Thinking. (S2T13)</p> <p><u>Innovation Vision and Strategy</u> Realizing innovation vision (.368) Strategic thinking (.358) Managing risk (.338)</p> <p><u>Innovation Recognition and Support</u> Recognizing the innovators (.333) Leading courageously ($M = 3.57$)</p> <p><u>Innovative Thinking</u> Opportunity exploration (.332) Idea application (.331) ($M = 3.57$) Assaulting assumptions (.328) Idea Championing ($M = 3.32$) Developing empathy for others (.327)</p>	<p>outcomes related to student innovation leadership skills regarding Innovation Recognition and Support, Innovative Thinking, and Innovation Vision and Strategy into the subjects in the curriculum and constantly revise and improve the use of learning outcomes in subject development.</p> <p>1.2.2 Develop and open elective subjects with the content of student innovation leadership skills regarding Innovation Recognition and Support, Innovative Thinking, and Innovation Vision and Strategy.</p> <p>1.2.3 Conduct training for teachers on subject integration and elective subjects.</p> <p>1.2.4 Evaluate the implementation of subject integration and elective subjects.</p>
<p>2. Transform teaching and learning to develop student innovation leadership skills (PNI_{modified} = .333/W) (WO)</p>	<p>2.1 Transform in-classroom and out-classroom learning activities to develop student innovation leadership skills focusing on innovation vision and strategy, innovative thinking, and innovation recognition and support. (W2O12)</p> <p><u>Innovation Vision and Strategy</u> Realizing innovation vision (.379) Managing risk (.359) Strategic thinking (.352)</p> <p><u>Innovative Thinking</u> Developing empathy for others (.346) Opportunity exploration (.342) Idea Championing ($M = 3.32$) Idea Application ($M = 3.57$)</p> <p><u>Innovation Recognition and Support</u> Leading courageously ($M = 3.57$)</p>	<p>2.1.1 Conduct training and development programs for teachers on new teaching methods focusing on experiential learning.</p> <p>2.1.2 Design classroom learning activities based on problem-based learning, project-based learning, collaborative learning or cooperative learning, service learning, and hands-on learning and extracurricular activities focusing on innovation and leadership, including competitions (e.g., project work), events of networking and invitation of guest speakers, and seminars and workshops emphasizing desired learning outcomes regarding innovation vision and strategy, innovative thinking, and innovation recognition and support.</p> <p>2.1.3 Engage local businesses and organizations as well as community in the learning process, such as project-based learning and workshops and seminars to give students opportunities for working out the real-world problems.</p>

Strategies	Substrategies	Procedures
		2.1.4 Monitor and evaluate the implementation of classroom learning activities and extracurricular activities using key performance indicators (KPI).
	<p>2.2 Develop learning media and resources to develop student innovation leadership skills focusing on innovation vision and strategy, innovative thinking, and innovation recognition and support. (W2O12)</p> <p><u>Innovation Vision and Strategy</u> Realizing innovation vision (.379) Managing risk (.359) Strategic thinking (.352)</p> <p><u>Innovative Thinking</u> Developing Empathy for others (.346) Opportunity exploration (.342) Idea Championing ($M = 3.32$) Idea Application ($M = 3.57$)</p> <p><u>Innovation Recognition and Support</u> Leading courageously ($M = 3.57$)</p>	<p>2.2.1 Formulate a school policy on the use of learning media and resources that encourages teachers to understand and use them effectively.</p> <p>2.2.2 Conduct training for teachers on how to use learning media and resources in developing innovation leadership skills of the students.</p> <p>2.2.3 Design learning media and resources that facilitate classroom learning activities and extracurricular activities as well as allow students to work on their own as a self-directed learner and work in a group work, such as maker space, real-world problem-solving space, and simulation space, with a focus on innovation vision and strategy, innovative thinking, and innovation recognition and support.</p> <p>2.2.4 Evaluate the effectiveness of learning media and resources used by teachers and students through, such as a survey and interview on satisfaction and research on causal relationship between learning media and resources and student learning.</p>
3. Improve measurement and evaluation to develop student innovation leadership skills (PNI _{modified} = .332/W) (WO)	<p>3.1 Develop measurement and evaluation tools on student learning outcomes set in the curriculum related to innovation leadership skills focusing on innovation vision and strategy, innovative thinking, and innovation recognition and support. (W3O13)</p> <p><u>Innovation Vision and Strategy</u> Realizing innovation vision (.379) Strategic thinking (.366) Managing risk (.350)</p> <p><u>Innovative Thinking</u> Developing Empathy for others (.344)</p>	<p>3.1.1 Conduct training for teachers about developing measurement and evaluation tools, used in the formative evaluation, particularly authentic assessment.</p> <p>3.1.2 Form a school committee for setting a school policy on measurement and evaluation of student learning outcomes regarding innovation vision and strategy, innovative thinking, and innovation recognition and support.</p> <p>3.1.3 Engage external stakeholders in the measurement and evaluation tool development.</p>

Strategies	Substrategies	Procedures
	Idea Championing ($M = 3.32$) Idea Application ($M = 3.57$) <u>Innovation Recognition and Support</u> Leading courageously ($M = 3.57$)	
	3.2 Promote assessment of student learning outcomes in innovation leadership skills focusing on innovation vision and strategy, innovative thinking, and innovation recognition and support. (W3O13) <u>Innovation Vision and Strategy</u> Realizing innovation vision (.379) Strategic thinking (.366) Managing risk (.350) <u>Innovative Thinking</u> Developing Empathy for others (.344) Idea Championing ($M = 3.32$) Idea Application ($M = 3.57$) <u>Innovation Recognition and Support</u> Leading courageously ($M = 3.57$)	3.2.1 Conduct training for teachers about measurement and evaluation techniques. 3.2.2 Develop a guideline for innovation leadership skills assessment. 3.2.3 Apply assessment for learning (i.e., formative assessment), including self-assessment, peer-assessment, performance assessment, and authentic assessment, such as portfolios, project work, and event performance and provide creative feedback to improve student learning on a regular basis, such as monthly and mid-semesterly, emphasizing desired learning outcomes regarding innovation vision and strategy, innovative thinking, and innovation recognition and support. 3.2.4 Evaluate the implementation of measurement and evaluation techniques. 3.2.5 Conduct training for teachers on using technology in the assessment. 3.2.6 Use technology in the assessment on student innovation leadership skills regarding innovation vision and strategy, innovative thinking, and innovation recognition and support. 3.2.7 Develop a guideline for using the technology in the assessment process. 3.2.8 Evaluate the use of technology in the assessment process.

4.4.4 Suitability and Feasibility of Academic Management Strategies of Secondary Schools Based on the Concept of Innovation Leadership Skills (Second Draft) by a Focus Group

Comments and suggestions on suitability and feasibility of secondary schools' academic management strategies based on the concept of innovation leadership skills (second draft) by a focus group were as follows:

- 1) All strategies, substrategies, and procedures were suitable, but the feasibility was limited. If they were long term, they were feasible.
- 2) The definition of the curriculum should be clear.
- 3) The school committee on curriculum development could not be implemented at the school level because Cambodia used the national curriculum and capability of human resources at the school level was not enough to do this. Therefore, for procedure 1.1.1 should be revised the word, such as school committee on study hour review, school committee on curriculum review and implementation, or school committee on curriculum implementation.
- 4) In the past, the core and elective subjects were used but could not implemented.
- 5) Should add “textbooks” into any substrategies or procedures.
- 6) Should respond to the community needs, not just only implement the national curriculum. The word “redesign” means adding to the existing curriculum, not creating a new one for the better.
- 7) Before the curriculum, governance, teacher education, parental and community involvement should be solved.

8) Train teachers to do more than textbooks and encourage students to do project work, active learning, and extracurricular activities.

9) Should add short courses for two or three months to the existing curriculum.

10) For project-based learning, schools participating in secondary school improvement project (SEIP) implemented this type of learning and interdisciplinary learning, such as income generation skills (planting project) and dehydrated mango project.

4.4.5 Academic management strategies of secondary Schools based on the concept of innovation leadership skills (final version).

Based on the focus group, the final version of the strategies, substrategies, and procedures was revised and developed as shown in Table 50 and Figure 5.

Table 50

Academic Management Strategies of Secondary Schools Based on the Concept of Innovation Leadership Skills (Final Version)

Strategies	Substrategies	Procedures
1. Redesign the curriculum to develop student innovation leadership skills (PNI _{modified} = .317/S) (SO/ST)	<p>1.1 Redesign the existing expected learning outcomes with innovation leadership skills regarding Innovation Vision and Strategy Innovation Recognition and Support, and Innovative Thinking across the disciplines of the school curriculum. (S1O11)</p> <p><u>Innovation Vision and Strategy</u> Realizing innovation vision (.368) Strategic thinking (.358) Managing risk (.338)</p> <p><u>Innovation Recognition and Support</u> Recognizing the innovators (.333) Leading courageously ($M = 3.57$)</p> <p><u>Innovative Thinking</u> Opportunity exploration (.332) Idea application (.331) ($M = 3.57$)</p>	<p>1.1.1 Form a school committee on curriculum review and implementation that include both internal and external stakeholders to set school policies and plans on the curriculum review and implementation that focus on students' innovation leadership skills regarding Innovation Vision and Strategy Innovation Recognition and Support, and Innovative Thinking.</p> <p>1.1.2 Study the concepts of innovation hub curriculum and interdisciplinary curriculum.</p> <p>1.1.3 Conduct training and workshops on innovation hub curriculum and interdisciplinary curriculum for all stakeholders by requesting support from the MoEYS.</p>

Strategies	Substrategies	Procedures
	Assaulting assumptions (.328) Idea championing ($M = 3.32$) Developing empathy for others (.327)	1.1.4 Apply the concepts of innovation hub curriculum and interdisciplinary curriculum in addition to the minimum existing curriculum. 1.1.5 Monitor and evaluate the implementation of the concepts of innovation hub curriculum and interdisciplinary curriculum.
	1.2 Promote the use of expected learning outcomes in subject development and textbooks related to innovation leadership skills regarding Innovation Vision and Strategy, Innovation Recognition and Support, and Innovative Thinking. (S2T13) <u>Innovation Vision and Strategy</u> Realizing innovation vision (.368) Strategic thinking (.358) Managing risk (.338) <u>Innovation Recognition and Support</u> Recognizing the innovators (.333) Leading courageously ($M = 3.57$) <u>Innovative Thinking</u> Opportunity exploration (.332) Idea application (.331) ($M = 3.57$) Assaulting assumptions (.328) Idea Championing ($M = 3.32$) Developing empathy for others (.327)	1.2.1 Integrate expected learning outcomes related to student innovation leadership skills regarding Innovation Recognition and Support, Innovative Thinking, and Innovation Vision and Strategy into the subjects and in addition to the textbooks in the curriculum and constantly revise and improve the use of learning outcomes in subject development. 1.2.2 Develop and open elective subjects or short courses (2-3 months) with the content of student innovation leadership skills regarding Innovation Recognition and Support, Innovative Thinking, and Innovation Vision and Strategy in addition to the minimum national curriculum. 1.2.3 Conduct training for teachers on subject integration, elective subjects and short courses by requesting support from the MoEYS. 1.2.4 Evaluate the implementation of subject integration, elective subjects, and short courses.
2. Transform teaching and learning to develop student innovation leadership skills (PNI _{modified} = .333/W) (WO)	2.1 Transform in-classroom and out-classroom learning activities to develop student innovation leadership skills focusing on innovation vision and strategy, innovative thinking, and innovation recognition and support. (W2O12) <u>Innovation Vision and Strategy</u> Realizing innovation vision (.379) Managing risk (.359) Strategic thinking (.352) <u>Innovative Thinking</u> Developing empathy for others	2.1.1 Conduct training and development programs for teachers on new teaching methods focusing on experiential learning by requesting support from the MoEYS. 2.1.2 Design classroom learning activities based on problem-based learning, project-based learning, collaborative learning or cooperative learning, service learning, and hands-on learning and extracurricular activities focusing on innovation and leadership, including competitions (e.g., project work), events of

Strategies	Substrategies	Procedures
	(.346) Opportunity exploration (.342) Idea Championing ($M = 3.32$) Idea Application ($M = 3.57$) <u>Innovation Recognition and Support</u> Leading courageously ($M = 3.57$)	networking and invitation of guest speakers , and seminars and workshops emphasizing desired learning outcomes regarding innovation vision and strategy, innovative thinking, and innovation recognition and support. 2.1.3 Engage local businesses and organizations as well as community in the learning process, such as project-based learning and workshops and seminars to give students opportunities for working out the real-world problems. 2.1.4 Monitor and evaluate the implementation of classroom learning activities and extracurricular activities using key performance indicators (KPI).
	2.2 Develop learning media and resources to develop student innovation leadership skills focusing on innovation vision and strategy, innovative thinking, and innovation recognition and support. (W2O12) <u>Innovation Vision and Strategy</u> Realizing innovation vision (.379) Managing risk (.359) Strategic thinking (.352) <u>Innovative Thinking</u> Developing Empathy for others (.346) Opportunity exploration (.342) Idea Championing ($M = 3.32$) Idea Application ($M = 3.57$) <u>Innovation Recognition and Support</u> Leading courageously ($M = 3.57$)	2.2.1 Formulate a school policy on the use of learning media and resources that encourages teachers to understand and use them effectively. 2.2.2 Conduct training for teachers on how to use learning media and resources in developing innovation leadership skills of the students and the evaluation on the effectiveness of learning media and resources used by requesting support from the MoEYS. 2.2.3 Design learning media and resources that facilitate classroom learning activities and extracurricular activities as well as allow students to work on their own as a self-directed learner and work in a group work, such as maker space, real-world problem-solving space, and simulation space, with a focus on innovation vision and strategy, innovative thinking, and innovation recognition and support. 2.2.4 Evaluate the effectiveness of learning media and resources used by teachers and students through, such as a survey and interview on satisfaction and research on causal relationship between learning media and resources

Strategies	Substrategies	Procedures
<p>3. Improve measurement and evaluation to develop student innovation leadership skills (PNI_{modified} = .332/W) (WO)</p>	<p>3.1 Develop measurement and evaluation tools on student learning outcomes set in the curriculum related to innovation leadership skills focusing on innovation vision and strategy, innovative thinking, and innovation recognition and support. (W3O13)</p> <p><u>Innovation Vision and Strategy</u> Realizing innovation vision (.379) Strategic thinking(.366) Managing risk (.350)</p> <p><u>Innovative Thinking</u> Developing Empathy for others (.344) Idea Championing (<i>M</i> = 3.32) Idea Application (<i>M</i> = 3.57)</p> <p><u>Innovation Recognition and Support</u> Leading courageously (<i>M</i> = 3.57)</p>	<p>and student learning.</p> <p>3.1.1 Conduct training for teachers about developing measurement and evaluation tools, used in the formative evaluation, particularly authentic assessment by requesting support from the MoEYS.</p> <p>3.1.2 Form a school committee for setting a school policy on measurement and evaluation of student learning outcomes regarding innovation vision and strategy, innovative thinking, and innovation recognition and support.</p> <p>3.1.3 Engage external stakeholders in the measurement and evaluation tool development.</p>
	<p>3.2 Promote assessment of student learning outcomes in innovation leadership skills focusing on innovation vision and strategy, innovative thinking, and innovation recognition and support. (W3O13)</p> <p><u>Innovation Vision and Strategy</u> Realizing innovation vision (.379) Strategic thinking(.366) Managing risk (.350)</p> <p><u>Innovative Thinking</u> Developing Empathy for others (.344) Idea Championing (<i>M</i> = 3.32) Idea Application (<i>M</i> = 3.57)</p> <p><u>Innovation Recognition and Support</u> Leading courageously (<i>M</i> = 3.57)</p>	<p>3.2.1 Conduct training for teachers about measurement and evaluation techniques by requesting support from the MoEYS.</p> <p>3.2.2 Develop a guideline for innovation leadership skills assessment.</p> <p>3.2.3 Apply assessment for learning (i.e., formative assessment), including self-assessment, peer-assessment, performance assessment, and authentic assessment, such as portfolios, project work, and event performance and provide creative feedback to improve student learning on a regular basis, such as monthly and mid-semesterly, emphasizing desired learning outcomes regarding innovation vision and strategy, innovative thinking, and innovation recognition and support.</p> <p>3.2.4 Evaluate the implementation of measurement and evaluation techniques.</p> <p>3.2.5 Conduct training for teachers on using technology in the assessment by requesting support from the MoEYS.</p>

Strategies	Substrategies	Procedures
		3.2.6 Use technology in the assessment on student innovation leadership skills regarding innovation vision and strategy, innovative thinking, and innovation recognition and support. 3.2.7 Develop a guideline for using the technology in the assessment process. 3.2.8 Evaluate the use of technology in the assessment process.

Table 51 provides a comparison among first, second, and final drafts of the strategies, substrategies, and procedures. The bold texts illustrate the differences.

Table 51

A Comparison among First, Second, and Final Drafts of the Strategies, Substrategies, and Procedures

First Draft	Second Draft	Final Version
Strategy 1. Redesign the curriculum to develop student innovation leadership skills (PNI _{modified} = .317/S) (SO/ST) Substrategy 1.1 Redesign learning outcomes in innovation leadership skills regarding Innovation Vision and Strategy Innovation Recognition and Support, and Innovative Thinking.p (S1O4) 1.1.1 Form a committee for curriculum development that include both internal and external stakeholders. 1.1.2 Design innovation hub curriculum and interdisciplinary curriculum for creating young innovation leaders who are supposed to have skills of Innovation Vision and Strategy, Innovation Recognition and Support, and Innovative	Strategy 1. Redesign the curriculum to develop student innovation leadership skills (PNI _{modified} = .317/S) (SO/ST) Substrategy 1.1 Redesign the existing expected learning outcomes with innovation leadership skills regarding innovation vision and strategy innovation recognition and support, and innovative thinking across the disciplines of the school curriculum. (S1O4) 1.1.1 Form a school committee on curriculum development that include both internal and external stakeholders to set school policies and plans on the curriculum that focuses on students' innovation leadership skills regarding Innovation Vision and Strategy, Innovation	Strategy 1. Redesign the curriculum to develop student innovation leadership skills (PNI _{modified} = .317/S) (SO/ST) Substrategy 1.1 Redesign the existing expected learning outcomes with innovation leadership skills regarding Innovation Vision and Strategy Innovation Recognition and Support, and Innovative Thinking across the disciplines of the school curriculum. (S1O4) 1.1.1 Form a school committee on curriculum review and implementation that include both internal and external stakeholders to set school policies and plans on the curriculum review and implementation that focus on students' innovation leadership skills regarding Innovation

First Draft	Second Draft	Final Version
<p>Thinking.</p> <p>1.1.3 Conduct workshops on new curricular (i.e., innovation hub curriculum and interdisciplinary curriculum) for all stakeholders before implementation to avoid misunderstanding.</p> <p>1.1.4 Monitor and evaluate the curriculum implementation.</p> <p>Substrategy 1.2 Promote the use of learning outcomes in subject development related to innovation leadership skills regarding Innovation Vision and Strategy, Innovation Recognition and Support, and Innovative Thinking. (S1T2)</p> <p>1.2.1 Integrate learning outcomes related to student innovation leadership skills regarding Innovation Recognition and Support, Innovative Thinking, and Innovation Vision and Strategy into the subjects in the curriculum.</p> <p>1.2.2 Open elective subjects with the content of student innovation leadership skills regarding Innovation Recognition and Support, Innovative Thinking, and Innovation Vision and Strategy.</p> <p>1.2.3 Evaluate learning outcomes of each subject related to student innovation leadership skills regarding Innovation Recognition and Support, Innovative Thinking, and Innovation Vision and Strategy that students have acquired through those subjects.</p>	<p>Recognition and Support, and Innovative Thinking.</p> <p>1.1.2 Design innovation hub curriculum and interdisciplinary curriculum for creating young innovation leaders who are supposed to have skills of Innovation Vision and Strategy, Innovation Recognition and Support, and Innovative Thinking.</p> <p>1.1.3 Conduct workshops on new curricular (i.e., innovation hub curriculum and interdisciplinary curriculum) for all stakeholders before implementation to avoid misunderstanding.</p> <p>1.1.4 Monitor and evaluate the implementation of the new curricular.</p> <p>Substrategy 1.2 Promote the use of expected learning outcomes in subject development related to innovation leadership skills regarding innovation vision and strategy, innovation recognition and support, and innovative thinking. (S1T2)</p> <p>1.2.1 Integrate expected learning outcomes related to student innovation leadership skills regarding Innovation Recognition and Support, Innovative Thinking, and Innovation Vision and Strategy into the subjects in the curriculum and constantly revise and improve the use of learning outcomes in subject development.</p> <p>1.2.2 Develop and open elective subjects with the content of student innovation leadership skills regarding Innovation Recognition and</p>	<p>Vision and Strategy Innovation Recognition and Support, and Innovative Thinking.</p> <p>1.1.2 Study the concepts of innovation hub curriculum and interdisciplinary curriculum.</p> <p>1.1.3 Conduct training and workshops on innovation hub curriculum and interdisciplinary curriculum for all stakeholders by requesting support from the MoEYS.</p> <p>1.1.4 Apply the concepts of innovation hub curriculum and interdisciplinary curriculum in addition to the minimum existing curriculum.</p> <p>1.1.5 Monitor and evaluate the implementation of the concepts of innovation hub curriculum and interdisciplinary curriculum.</p> <p>Substrategy 1.2 Promote the use of expected learning outcomes in subject development and textbooks related to innovation leadership skills regarding Innovation Vision and Strategy, Innovation Recognition and Support, and Innovative Thinking. (S1T2)</p> <p>1.2.1 Integrate expected learning outcomes related to student innovation leadership skills regarding Innovation Recognition and Support, Innovative Thinking, and Innovation Vision and Strategy into the subjects and in addition to the textbooks in the curriculum and constantly revise and improve the use of learning outcomes in subject development.</p> <p>1.2.2 Develop and open elective subjects or short courses (2-3 months) with the content of</p>

First Draft	Second Draft	Final Version
	<p>Support, Innovative Thinking, and Innovation Vision and Strategy.</p> <p>1.2.3 Conduct training for teachers on subject integration and elective subjects.</p> <p>1.2.4 Evaluate the implementation of subject integration and elective subjects.</p>	<p>student innovation leadership skills regarding Innovation Recognition and Support, Innovative Thinking, and Innovation Vision and Strategy in addition to the minimum national curriculum.</p> <p>1.2.3 Conduct training for teachers on subject integration, elective subjects and short courses by requesting support from the MoEYS.</p> <p>1.2.4 Evaluate the implementation of subject integration, elective subjects, and short courses.</p>
<p>Strategy 2. Transform teaching and learning to develop student innovation leadership skills (PNI_{modified} = .333/W) (WO)</p> <p>Substrategy 2.1 Transform in-classroom and out-classroom learning activities to develop student innovation leadership skills focusing on innovation vision and strategy, innovative thinking, and innovation recognition and support. (W1O1)</p> <p>2.1.1 Conduct training and development programs for teachers on new teaching methods focusing on experiential learning.</p> <p>2.1.2 Design classroom learning activities including problem-based learning, project-based learning, collaborative learning or cooperative learning, service learning, and hands-on learning and extracurricular activities focusing on innovation and leadership, including competitions (e.g., project work), events of networking and invitation of</p>	<p>Strategy 2. Transform teaching and learning to develop student innovation leadership skills (PNI_{modified} = .333/W) (WO)</p> <p>Substrategy 2.1 Transform in-classroom and out-classroom learning activities to develop student innovation leadership skills focusing on innovation vision and strategy, innovative thinking, and innovation recognition and support. (W1O1)</p> <p>2.1.1 Conduct training and development programs for teachers on new teaching methods focusing on experiential learning.</p> <p>2.1.2 Design classroom learning activities based on problem-based learning, project-based learning, collaborative learning or cooperative learning, service learning, and hands-on learning and extracurricular activities focusing on innovation and leadership, including competitions (e.g., project work), events of networking and invitation of guest speakers , and seminars and workshops</p>	<p>Strategy 2. Transform teaching and learning to develop student innovation leadership skills (PNI_{modified} = .333/W) (WO)</p> <p>Substrategy 2.1 Transform in-classroom and out-classroom learning activities to develop student innovation leadership skills focusing on innovation vision and strategy, innovative thinking, and innovation recognition and support. (W1O1)</p> <p>2.1.1 Conduct training and development programs for teachers on new teaching methods focusing on experiential learning by requesting support from the MoEYS.</p> <p>2.1.2 Design classroom learning activities based on problem-based learning, project-based learning, collaborative learning or cooperative learning, service learning, and hands-on learning and extracurricular activities focusing on innovation and leadership, including competitions (e.g., project work), events of networking and invitation of guest speakers , and</p>

First Draft	Second Draft	Final Version
<p>guest speakers , and seminars and workshops emphasizing desired learning outcomes regarding innovation vision and strategy, innovative thinking, and innovation recognition and support.</p> <p>2.1.3 Engage local businesses and organizations as well as community in the learning process, such as project-based learning and workshops and seminars to give students opportunities for working out the real-world problems.</p> <p>2.1.4 Monitor and evaluate the implementation of classroom learning activities and extracurricular activities using key performance indicators (KPI).</p> <p>Substrategy 2.2 Develop learning media and resources to develop student innovation leadership skills focusing on innovation vision and strategy, innovative thinking, and innovation recognition and support. (W1O1)</p> <p>2.2.1 Formulate a policy on the use of learning media and resources that encourage teachers to understand and use them effectively.</p> <p>2.2.2 Design learning media and resources that facilitate classroom learning activities and extracurricular activities as well as allow students to work on their own as a self-directed learner and work in a group work, such a s maker space, real-world problem-solving space, and simulation space, with focus on innovation vision and strategy, innovative thinking, and innovation recognition</p>	<p>emphasizing desired learning outcomes regarding innovation vision and strategy, innovative thinking, and innovation recognition and support.</p> <p>2.1.3 Engage local businesses and organizations as well as community in the learning process, such as project-based learning and workshops and seminars to give students opportunities for working out the real-world problems.</p> <p>2.1.4 Monitor and evaluate the implementation of classroom learning activities and extracurricular activities using key performance indicators (KPI).</p> <p>Substrategy 2.2 Develop learning media and resources to develop student innovation leadership skills focusing on innovation vision and strategy, innovative thinking, and innovation recognition and support. (W1O1)</p> <p>2.2.1 Formulate a school policy on the use of learning media and resources that encourages teachers to understand and use them effectively.</p> <p>2.2.2 Conduct training for teachers on how to use learning media and resources in developing innovation leadership skills of the students.</p> <p>2.2.3 Design learning media and resources that facilitate classroom learning activities and extracurricular activities as well as allow students to work on their own as a self-directed learner and work in a group work, such as maker space, real-world problem-solving space, and simulation space,</p>	<p>seminars and workshops emphasizing desired learning outcomes regarding innovation vision and strategy, innovative thinking, and innovation recognition and support.</p> <p>2.1.3 Engage local businesses and organizations as well as community in the learning process, such as project-based learning and workshops and seminars to give students opportunities for working out the real-world problems.</p> <p>2.1.4 Monitor and evaluate the implementation of classroom learning activities and extracurricular activities using key performance indicators (KPI).</p> <p>Strategy 2.2 Develop learning media and resources to develop student innovation leadership skills focusing on innovation vision and strategy, innovative thinking, and innovation recognition and support. (W1O1)</p> <p>2.2.1 Formulate a school policy on the use of learning media and resources that encourages teachers to understand and use them effectively.</p> <p>2.2.2 Conduct training for teachers on how to use learning media and resources in developing innovation leadership skills of the students and the evaluation on the effectiveness of learning media and resources used by requesting support from the MoEYS.</p> <p>2.2.3 Design learning media and resources that facilitate classroom learning activities and extracurricular activities as well as allow students to work on</p>

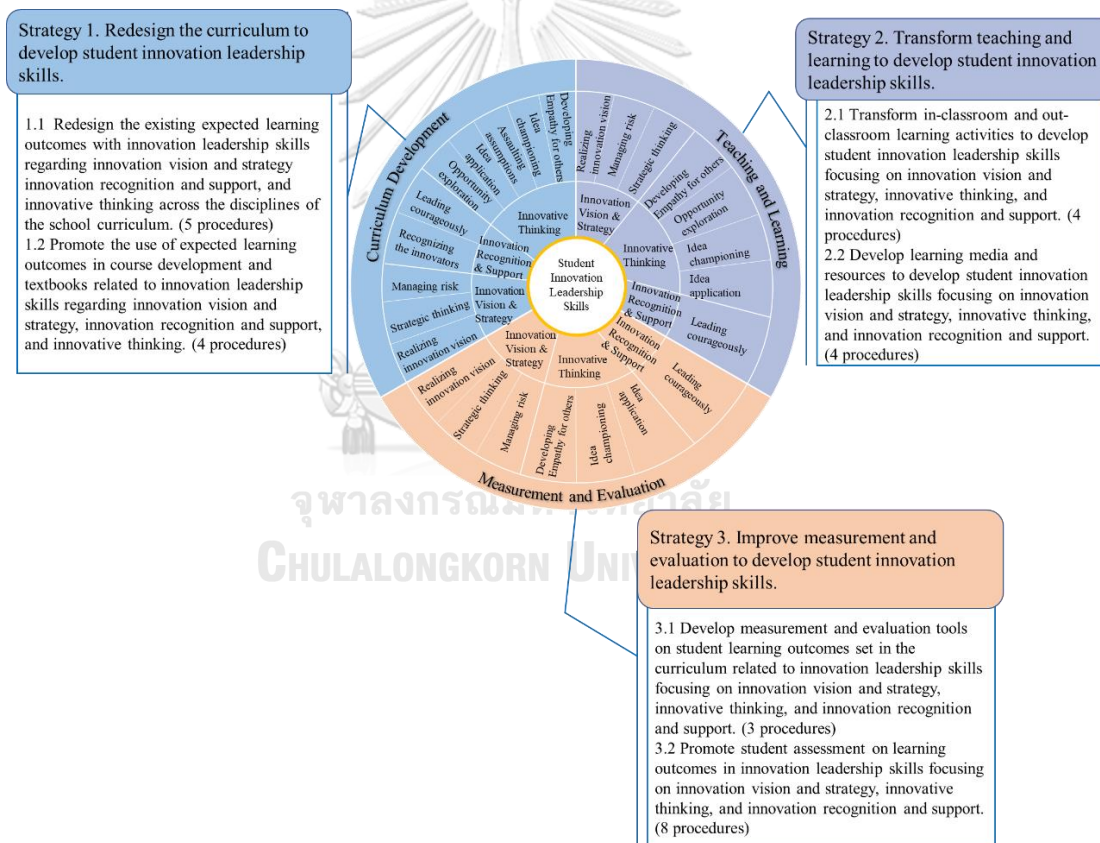
First Draft	Second Draft	Final Version
<p>and support.</p> <p>2.2.3 Evaluate the effectiveness of learning media and resources used by teachers and students through, such as a survey and interview on satisfaction and research on causal relationship between learning media and resources and student learning.</p>	<p>with a focus on innovation vision and strategy, innovative thinking, and innovation recognition and support.</p> <p>2.2.4 Evaluate the effectiveness of learning media and resources used by teachers and students through, such as a survey and interview on satisfaction and research on causal relationship between learning media and resources and student learning.</p>	<p>their own as a self-directed learner and work in a group work, such as maker space, real-world problem-solving space, and simulation space, with a focus on innovation vision and strategy, innovative thinking, and innovation recognition and support.</p> <p>2.2.4 Evaluate the effectiveness of learning media and resources used by teachers and students through, such as a survey and interview on satisfaction and research on causal relationship between learning media and resources and student learning.</p>
<p>Strategy 3. Improve measurement and evaluation to develop student innovation leadership skills ($PNI_{\text{modified}} = .332/W$) (WO)</p> <p>Substrategy 3.1 Develop measurement and evaluation tools on student learning outcomes set in the curriculum related to innovation leadership skills focusing on innovation vision and strategy, innovative thinking, and innovation recognition and support. (W1O4)</p> <p>3.1.1 Conduct training for teachers about measurement and evaluation techniques, particularly formative and summative evaluation, as well as authentic assessment.</p> <p>3.1.2 Form a committee for setting a policy on measurement and evaluation on student learning outcomes regarding innovation vision and strategy, innovative thinking, and innovation recognition and support.</p> <p>3.1.3 Apply assessment for</p>	<p>Strategy 3. Improve measurement and evaluation to develop student innovation leadership skills ($PNI_{\text{modified}} = .332/W$) (WO)</p> <p>Substrategy 3.1 Develop measurement and evaluation tools on student learning outcomes set in the curriculum related to innovation leadership skills focusing on innovation vision and strategy, innovative thinking, and innovation recognition and support. (W1O4)</p> <p>3.1.1 Conduct training for teachers about developing measurement and evaluation tools, used in the formative evaluation, particularly authentic assessment.</p> <p>3.1.2 Form a school committee for setting a school policy on measurement and evaluation of student learning outcomes regarding innovation vision and strategy, innovative thinking, and innovation recognition and support.</p> <p>3.1.3 Engage external stakeholders in the</p>	<p>Strategy 3. Improve measurement and evaluation to develop student innovation leadership skills ($PNI_{\text{modified}} = .332/W$) (WO)</p> <p>Substrategy 3.1 Develop measurement and evaluation tools on student learning outcomes set in the curriculum related to innovation leadership skills focusing on innovation vision and strategy, innovative thinking, and innovation recognition and support. (W1O4)</p> <p>3.1.1 Conduct training for teachers about developing measurement and evaluation tools, used in the formative evaluation, particularly authentic assessment by requesting support from the MoEYS.</p> <p>3.1.2 Form a school committee for setting a school policy on measurement and evaluation of student learning outcomes regarding innovation vision and strategy, innovative thinking, and innovation recognition and support.</p> <p>3.1.3 Engage external</p>

First Draft	Second Draft	Final Version
<p>learning (i.e., formative assessment), including self-assessment and peer-assessment and provide creative feedback to improve student learning on a regular basis, such as monthly and mid-semesterly, emphasizing desired learning outcomes regarding innovation vision and strategy, innovative thinking, and innovation recognition and support.</p> <p>3.1.4 Conduct performance assessment and authentic assessment, such as portfolios, project work, and event performance, with a focus with students' innovation leadership skills regarding innovation vision and strategy, innovative thinking, and innovation recognition and support.</p> <p>Substrategy 3.2 Promote assessment of student learning outcomes in innovation leadership skills focusing on innovation vision and strategy, innovative thinking, and innovation recognition and support. (W1O4)</p> <p>3.2.1 Formulate a policy on measurement and evaluation on subjects that focus on student innovation leadership skills regarding innovation vision and strategy, innovative thinking, and innovation recognition and support.</p> <p>3.2.2 Use technology in the assessment on student innovation leadership skills regarding innovation vision and strategy, innovative thinking, and innovation</p>	<p>measurement and evaluation tool development.</p> <p>Substrategy 3.2 Promote assessment of student learning outcomes in innovation leadership skills focusing on innovation vision and strategy, innovative thinking, and innovation recognition and support. (W1O4)</p> <p>3.2.1 Conduct training for teachers about measurement and evaluation techniques.</p> <p>3.2.2 Develop a guideline for innovation leadership skills assessment.</p> <p>3.2.3 Apply assessment for learning (i.e., formative assessment), including self-assessment, peer-assessment, performance assessment, and authentic assessment, such as portfolios, project work, and event performance and provide creative feedback to improve student learning on a regular basis, such as monthly and mid-semesterly, emphasizing desired learning outcomes regarding innovation vision and strategy, innovative thinking, and innovation recognition and support.</p> <p>3.2.4 Evaluate the implementation of measurement and evaluation techniques.</p> <p>3.2.5 Conduct training for teachers on using technology in the assessment.</p> <p>3.2.6 Use technology in the assessment on student innovation leadership skills regarding innovation vision and strategy, innovative thinking, and innovation recognition and support.</p> <p>3.2.7 Develop a guideline for</p>	<p>stakeholders in the measurement and evaluation tool development.</p> <p>Substrategy 3.2 Promote assessment of student learning outcomes in innovation leadership skills focusing on innovation vision and strategy, innovative thinking, and innovation recognition and support. (W1O4)</p> <p>3.2.1 Conduct training for teachers about measurement and evaluation techniques by requesting support from the MoEYS.</p> <p>3.2.2 Develop a guideline for innovation leadership skills assessment.</p> <p>3.2.3 Apply assessment for learning (i.e., formative assessment), including self-assessment, peer-assessment, performance assessment, and authentic assessment, such as portfolios, project work, and event performance and provide creative feedback to improve student learning on a regular basis, such as monthly and mid-semesterly, emphasizing desired learning outcomes regarding innovation vision and strategy, innovative thinking, and innovation recognition and support.</p> <p>3.2.4 Evaluate the implementation of measurement and evaluation techniques.</p> <p>3.2.5 Conduct training for teachers on using technology in the assessment by requesting support from the MoEYS.</p> <p>3.2.6 Use technology in the assessment on student innovation leadership skills regarding innovation vision and strategy, innovative thinking,</p>

First Draft	Second Draft	Final Version
recognition and support. 3.2.3 Evaluate the assessment process implemented as set in the policy.	using the technology in the assessment process. 3.2.8 Evaluate the use of technology in the assessment process.	and innovation recognition and support. 3.2.7 Develop a guideline for using the technology in the assessment process. 3.2.8 Evaluate the use of technology in the assessment process.

Figure 5

Academic Management Strategies of Secondary Schools Based on the Concept of Innovation Leadership Skills (Final Version)



CHAPTER 5

CONCLUSIONS, DISCUSSIONS, AND RECOMMENDATIONS

This chapter delivers a summary of the study, which infers and discusses key findings with the literature. It also includes recommendations for practice and further research. The summary of key findings is presented in accordance with the research objectives as follows:

1. To study conceptual frameworks of academic management of secondary schools and innovation leadership skills
2. To study innovation leadership skills levels of secondary school students
3. To analyze strengths, weaknesses, opportunities, and threats of secondary schools' academic management based on the concept of innovation leadership skills
4. To develop academic management strategies of secondary schools based on the concept of innovation leadership skills

5.1 Conclusions

5.1.1 Conceptual Frameworks of Academic Management of Secondary Schools and Innovation Leadership Skills

The conceptual framework of academic management of secondary schools in Cambodia consisted of three areas: 1) curriculum development, 2) teaching and learning, and 3) measurement and evaluation. The conceptual framework of innovation leadership skills was comprised of three skill categories and 15 skills: 1) innovation vision and strategy including realizing innovation vision, strategic thinking, and managing risks, 2) innovative thinking including developing empathy for others, demonstrating curiosity, opportunity exploration, assaulting assumptions, proactive thinking, idea generation, idea championing, idea application, and 3)

innovation recognition and support including leading courageously, leading by example, promoting a culture of trust, and recognizing the innovators.

5.1.2 Innovation Leadership Skills Levels of the Students

Students' innovation leadership skills level in an overall aspect was at the high level. Among the three skill categories, innovation recognition and support had the highest mean score, while innovative thinking had the lowest mean score. Among the 15 skills, all skills were perceived at the high level, except for idea championing, which was perceived at the moderate level. The top three skills with highest mean scores included strategic thinking, recognizing innovators, and demonstrating curiosity. In contrast, the bottom three skills with lowest mean scores consisted of idea championing, idea application, and leading courageously.

5.1.3 Strengths, Weaknesses, Opportunities, and Threats of Secondary Schools' Academic Management Based on the Concept of Innovation Leadership Skills

Among the three areas of academic management, curriculum development was the strength, while teaching and learning and measurement and evaluation were the weaknesses. Regarding skill categories of innovation leadership skills for the three areas of academic management, innovation recognition and support and innovative thinking were the strengths, while innovation vision and strategy were the weakness. Regarding the 15 innovation leadership skills for the three areas of academic management, all three skills including realizing innovation vision, strategic thinking, and managing risks in the innovation vision and strategy category were the weaknesses. All four skills (i.e., leading courageously, leading by example, promoting a culture of trust, and recognizing innovators) in the innovation recognition and

support category for all three areas of academic management were the strengths, except for recognizing innovators in curriculum development. Developing empathy for others in the innovative thinking category was the weakness for all three areas of academic management.

Regarding internal environments, in overall aspects the political-legal factor was only opportunity, while three other factors including economic, sociocultural, and technological were the threats. All external environments were the opportunities for curriculum development. Regarding the three areas of academic management, sociocultural and technological factors were the opportunities for curriculum development and measurement and evaluation but were the threats to teaching and learning. Political-legal factors were the opportunities for curriculum development and teaching and learning but were the threats to measurement and evaluation. Economic factors were the opportunities for curriculum development but were the threats to teaching and learning and measurement and evaluation. Regarding skill categories of innovation leadership skills for all three areas of academic management, all external environments were the threats to innovation vision and strategy but were the opportunities for innovation recognition and support. For all three areas of academic management, technological factors were the threats to innovative thinking. Regarding innovative thinking, economic and sociocultural factors were the opportunities for curriculum development and teaching and learning but were the threats to measurement and evaluation. Regarding innovative thinking, political factors were the opportunities for curriculum development and measurement and evaluation but were the threats to teaching and learning.

5.1.4 Academic Management Strategies of Secondary Schools Based on the Concept of Innovation Leadership Skills (Final Version)

Academic Management Strategies of Secondary Schools Based on the Concept of Innovation Leadership Skills (Final Version) consisted of three strategies, six substrategies, and 28 procedures as follows:

Strategy 1: Redesign the curriculum to develop student innovation leadership skills

Substrategy 1.1: Redesign the existing expected learning outcomes with innovation leadership skills regarding Innovation Vision and Strategy Innovation Recognition and Support, and Innovative Thinking across the disciplines of the school curriculum.

Procedure 1.1.1: Form a school committee on curriculum review and implementation that include both internal and external stakeholders to set school policies and plans on the curriculum review and implementation that focus on students' innovation leadership skills regarding Innovation Vision and Strategy Innovation Recognition and Support, and Innovative Thinking.

Procedure 1.1.2: Study the concepts of innovation hub curriculum and interdisciplinary curriculum.

Procedure 1.1.3: Conduct training and workshops on innovation hub curriculum and interdisciplinary curriculum for all stakeholders by requesting support from the MoEYS.

Procedure 1.1.4: Apply the concepts of innovation hub curriculum and interdisciplinary curriculum in addition to the minimum existing curriculum.

Procedure 1.1.5: Monitor and evaluate the implementation of the concepts of innovation hub curriculum and interdisciplinary curriculum.

Strategy 1.2: Promote the use of learning outcomes in subject development and textbooks related to innovation leadership skills regarding Innovation Vision and Strategy, Innovation Recognition and Support, and Innovative Thinking.

Procedure 1.2.1: Integrate expected learning outcomes related to student innovation leadership skills regarding Innovation Recognition and Support, Innovative Thinking, and Innovation Vision and Strategy into the subjects and in addition to the textbooks in the curriculum and constantly revise and improve the use of learning outcomes in subject development.

Procedure 1.2.2: Develop and open elective subjects or short courses (2-3 months) with the content of student innovation leadership skills regarding Innovation Recognition and Support, Innovative Thinking, and Innovation Vision and Strategy in addition to the minimum national curriculum.

Procedure 1.2.3: Conduct training for teachers on subject integration, elective subjects and short courses by requesting support from the MoEYS.

Procedure 1.2.4: Evaluate the implementation of subject integration, elective subjects, and short courses.

Strategy 2: Transform teaching and learning to develop student innovation leadership skills

Substrategy 2.1: Transform in-classroom and out-classroom learning activities to develop student innovation leadership skills focusing on innovation vision and strategy, innovative thinking, and innovation recognition and support.

Procedure 2.1.1: Conduct training and development programs for teachers on new teaching methods focusing on experiential learning by requesting support from the MoEYS.

Procedure 2.1.2: Design classroom learning activities based on problem-based learning, project-based learning, collaborative learning or cooperative learning, service learning, and hands-on learning and extracurricular activities focusing on innovation and leadership, including competitions (e.g., project work), events of networking and invitation of guest speakers, and seminars and workshops emphasizing desired learning outcomes regarding innovation vision and strategy, innovative thinking, and innovation recognition and support.

Procedure 2.1.3: Engage local businesses and organizations as well as community in the learning process, such as project-based learning and workshops and seminars to give students opportunities for working out the real-world problems.

Procedure 2.1.4: Monitor and evaluate the implementation of classroom learning activities and extracurricular activities using key performance indicators (KPI).

Substrategy 2.2: Develop learning media and resources to develop student innovation leadership skills focusing on innovation vision and strategy, innovative thinking, and innovation recognition and support.

Procedure 2.2.1: Formulate a school policy on the use of learning media and resources that encourages teachers to understand and use them effectively.

Procedure 2.2.2: Conduct training for teachers on how to use learning media and resources in developing innovation leadership skills of the students and the

evaluation on the effectiveness of learning media and resources used by requesting support from the MoEYS.

Procedure 2.2.3: Design learning media and resources that facilitate classroom learning activities and extracurricular activities as well as allow students to work on their own as a self-directed learner and work in a group work, such as maker space, real-world problem-solving space, and simulation space, with a focus on innovation vision and strategy, innovative thinking, and innovation recognition and support.

Procedure 2.2.4: Evaluate the effectiveness of learning media and resources used by teachers and students through, such as a survey and interview on satisfaction and research on causal relationship between learning media and resources and student learning.

Strategy 3: Improve measurement and evaluation to develop student innovation leadership skills

Substrategy 3.1: Develop measurement and evaluation tools on student learning outcomes set in the curriculum related to innovation leadership skills focusing on innovation vision and strategy, innovative thinking, and innovation recognition and support.

Procedure 3.1.1: Conduct training for teachers about developing measurement and evaluation tools, used in the formative evaluation, particularly authentic assessment by requesting support from the MoEYS.

Procedure 3.1.2: Form a school committee for setting a school policy on measurement and evaluation of student learning outcomes regarding innovation vision and strategy, innovative thinking, and innovation recognition and support.

Procedure 3.1.3: Engage external stakeholders in the measurement and evaluation tool development.

Substrategy 3.2: Promote assessment of student learning outcomes in innovation leadership skills focusing on innovation vision and strategy, innovative thinking, and innovation recognition and support.

Procedure 3.2.1: Conduct training for teachers about measurement and evaluation techniques by requesting support from the MoEYS.

Procedure 3.2.2: Develop a guideline for innovation leadership skills assessment.

Procedure 3.2.3: Apply assessment for learning (i.e., formative assessment), including self-assessment, peer-assessment, performance assessment, and authentic assessment, such as portfolios, project work, and event performance and provide creative feedback to improve student learning on a regular basis, such as monthly and mid-semesterly, emphasizing desired learning outcomes regarding innovation vision and strategy, innovative thinking, and innovation recognition and support.

Procedure 3.2.4: Evaluate the implementation of measurement and evaluation techniques.

Procedure 3.2.5: Conduct training for teachers on using technology in the assessment by requesting support from the MoEYS.

Procedure 3.2.6: Use technology in the assessment on student innovation leadership skills regarding innovation vision and strategy, innovative thinking, and innovation recognition and support.

Procedure 3.2.7: Develop a guideline for using the technology in the assessment process.

Procedure 3.2.8: Evaluate the use of technology in the assessment process.

5.2 Discussions

5.2.1 Conceptual Frameworks of Academic Management of Secondary Schools and Innovation Leadership Skills

This study yielded the three areas of academic management, including curriculum development, teaching and learning, and measurement and evaluation, as evaluated by the experts. This result may explain that the three areas are deemed important components that support the expected learning outcomes of the students—innovation leadership skills. Another reason is that the three areas are derived from the synthesis of relevant literature, so they cover overall aspects of academic management. Most studies took these three components into academic management (Boonkua et al., 2020; Hang, 2017; Sanitklang, 2018; Sriporn, 2018; Wongtienlai, 2019). Some studies considered learning media and resources as a separate component from teaching and learning; however, the current study took it in teaching and learning because in the teaching and learning process it always requires learning materials and resources. Extracurricular activities were also included in teaching and learning. Generally, learning activities consist of in-classroom and out-classroom activities.

Similarly, conceptual framework of innovation leadership skills proposed by the researcher were not revised because the components of innovation leadership skills were reviewed and synthesized from relevant literature (Graham-Leviss, 2016; Gross, 2017; Jovana, 2020; Tucker, 2017) and the component suggested by the experts overlapped the existing component. The proposed three skill categories cover overall aspect of innovation leaders as they comprise vision (i.e., innovation vision

and strategy), personal excellence (i.e., innovative thinking), and support (i.e., innovation recognition and support). As a leader, he or she must have a vision for directing the team, possess personal excellence for getting things done, and support and encourage team members to achieve the goals.

5.2.2 Innovation Leadership Skills Levels of the Students

Innovation recognition and support, including leading courageously, leading by example, promoting a culture of trust, and recognizing innovators, were rated the highest. This result may explain that students exercise their leadership frequently by supporting team members and acting as a model. The reason is that at the secondary school level the most obvious problem is discipline. Student council play a role in this matter. They help peers obey the school rules and other regulations by modeling and motivating to correct their peers' misconduct. Like student council members, ordinary students (students who are not in any position offered in the school) perceived themselves high scores in this skill category because they can observe student council, and they are old enough to distinguish between wrong and right things. The prominent model of relational leadership that is suitable for students may explain this result (Komives et al., 2007). This kind of leadership model is not like leadership in position that is usually adopted by adult leaders. Komives and colleagues explain relational leadership into five elements: 1) empowering – engaging all group members in ways that fully utilize their talents and perspectives; 2) inclusive – open to diverse ideas and diverse people, seeking out shareholders and stakeholders to work collaboratively for change; 3) purposeful – being about accomplishing something positive; 4) ethical – respecting both modal and end values, as well as requiring honesty, trust, character, and truthfulness from group members; and 5) process-oriented – paying attention to

the group's normative practices that bring individuals together in community and shared leadership duties.

Innovative thinking and innovation vision and strategy were perceived low scores. They included idea championing, idea application, idea generation, assaulting assumptions, and managing risks. The results infer that students lack innovative behaviors. As this study covered both traditional and new generation schools (NGS), as well as other types of schools such as resource schools, the results may be mixed. Only two NGS participated in the study. Unlike NGS, ordinary school students acquire traditional teaching method (i.e., lecturing). They have very less opportunity for exercising their innovative behavior; expressing ideas for solving a problem, for example. Students are not trained to make a strategic plan and anticipate the risks that may happen during implementing the project. In Cambodian public schools, students have less opportunity for doing out-classroom activities. The students simply manage the tasks following the guidance of adviser teachers. Graham-Leviss (2016) found that innovative leaders rated 25% higher than noninnovative leaders on risk management. In addition, noninnovative leaders scored higher on maintaining order and accuracy.

5.2.3 Strengths, Weaknesses, Opportunities, and Threats of Secondary Schools' Academic Management Based on the Concept of Innovation Leadership Skills

Regarding the internal environments, curriculum development was the strength. This result may be because all schools adopt the common national curriculum that they believe it can enhance students' innovation leadership skills. However, teaching and learning were the weakness. This result reflects the reality of Cambodian education. As discussed earlier, Cambodian ordinary schools usually

adopt traditional teaching styles (e.g., lecturing) that cannot facilitate student autonomy and the student-centered approach. Developing students' innovation leadership skills, educators are required to use experiential or hands-on learning. Bertola et al. (2016) explained the way educational institutions moved beyond disciplinary boundaries that led to investigating with various teaching practices placed on field learning, project-based learning, and collaborative learning, such as the School of Information (I-School) at the University of California, the smallest and youngest school in Berkeley that states:

I School is a graduate research and education community committed to expanding access to information and to improving its usability, reliability, and credibility while preserving security and privacy. This requires the insights of scholars from diverse fields—information and computer science, design, social sciences, management, law, and policy. (p. 107)

In some cases, at the Koln International School of Design, students are allowed to create their own curriculum through selecting short, medium, long-term projects, workshops or seminars (as cited in Bertola et al., 2016).

On the other hand, the new generation school (NGS) project (see, MoEYS, 2016, for more detail) is a new reform for Cambodia education at the school level. The project reforms school directorship by recruiting school directors who have willingness to change the status quo. Despite the unchanged curriculum, teaching methods at the NGS center on modern teaching practices, such as problem-based learning or project-based learning (PBL).

As this study covered most of the ordinary schools, school directors and teachers could perceive teaching and learning as the weakness to develop students'

innovation leadership skills. In this regard, school directors and teachers must embrace the change so that they educate students to become innovation leaders.

Regarding innovation leadership skills dimensions, innovation vision and strategy were the weaknesses for all three areas of academic management because at the school level students enact their leadership in the form of relationship with their peers rather than leadership in position. They also have less time allowed or less opportunities for leading like adult leaders. Thus, they seem not to realize how to plan or even develop strategic vision and make it into reality for their members. Concerning this, schools should provide more opportunities for students to practice and support them by training and coaching. On the other hand, innovation recognition and support were the strength because unlike adult leaders, students realize their leadership by helping and supporting peers to be better, such as disciplinary and slow study issues.

In terms of the external environments, only political-legal factors were the opportunities for teaching and learning. This result is consistent with the education reform in Cambodia led by Minister of Education, H.E. Dr. ChuonNaron Hang. Many policies and legal documents have been created to support the reform, such as teacher career pathway policy and new generation school policy. The NGS initiative is one of 15 programs in Cambodia's Education Strategic Plan (2014-2018) aimed at arranging students for the workforce of the twenty-first century (Donaher & Wu, 2020). Moreover, the government policy on increasing salary of educational personnel twice a year have boosted the morale of educational staff, especially teachers.

The other three external factors, including economic, sociocultural, and technological factors, were the threats to teaching and learning. The results may

explain lower-middle income country, a lack of parental and community involvement in education, and a lack of technology skills among educational staff. Even though economic growth rates of Cambodia have been almost equally seven percent (7%) per year for the last few years, it is not sufficient to distribute to modernize teaching practices and resources. Cambodia needs donors, such as Asia Development Bank (ADB) and World Bank, to help. With regard to sociocultural factors, parents and community do not widely recognize their important roles in educating their children. They are busy with their work and think that educating their children is the school's role alone. With technology advancement, school administrators and teachers feel that they leave behind it. They require the MoEYS to train them; during COVID-19 the MoEYS encouraged and trained the schools to run online learning, for example. Cambodian schools are not independent to use the technology in the teaching and learning process.

5.2.4 Academic Management Strategies of Secondary Schools Based on the Concept of Innovation Leadership Skills (Final Version)

The discussions in this section are presented according to the three strategies as follows.

1) Strategy 1: Redesign the Curriculum to Develop Student Innovation Leadership Skills

This strategy consisted of two substrategies and nine procedures. One of the procedures centered on creating school committee on curriculum review and implementation. In the second draft of the strategy, the procedure was establishing school committee on curriculum development. However, during the focus group, most participants worried about the implementation of the procedure because in the

Cambodian context, all schools use the common national curriculum, they agreed that it was suitable for long-term implementation, though.

Another reason is that the competences of school directors and teachers are limited in curriculum development. One of the participants in the focus group stated, “...even officials in the MoEYS are not sure what the curriculum is,” so the establishment of committee on curriculum development at the school level is unlikely to be implemented. Most participants suggested that revision of words was able to be made, such as school committee on curriculum review or curriculum implementation. Therefore, the procedure was revised. In this regard, training and development were included in each substrategy, in support from the MoEYS. Actually, teachers are the important actor in curriculum development. Experts may center on the need for high-level skills in their own field, whereas teachers may see a curriculum that will work for students with widely various skills and interests (Levin, 2010).

Another controversial issue is elective subject development. One participant in the focus group stated that the core and elective system were used before; however, it was hard to implement for practitioners. Thus, it moved from that system to the current system. This point is obviously true in Cambodia school contexts. However, the meaning of elective subject in the procedure is additional courses to the national curriculum; it does not mean to restructure the existing curriculum. The national curriculum cannot respond to the needs of local communities where the schools are located. Different communities have different needs, such as urban versus rural areas. It is understandable that Cambodian schools are required to teach students to pass the high-stake examination at the twelfth grade, or their students will find it hard to continue higher education. In Cambodia, students who fail the national examination at

the twelfth-grade level have only two options: 1) retaking the examination next year or 2) studying associate degree at the higher education level. This requirement led schools to prepare their students for the examination that elicits the contents from the national core curriculum. In this concern, all students must learn the same contents.

In literature or other country contexts, Thailand also has the core curriculum, but it allows schools to add elective subjects based on the local needs of the schools for certain hours set in the curriculum structure (see Ministry of Education, 2008, for detail). The higher the grade is, the more elective subjects are allowed. For instance, at the lower secondary level additional subjects or activities are allowed for not more than 200 hours per year (equivalent to one or two subjects), and for at least 1,600 hours per year at the upper secondary level. In Finland, the core curriculum is used as a guidance to make the local curriculum (Vitikka et al., 2012). In Cambodia context, in the short-term, one or two additional subjects to the existing core curriculum can be implemented by supporting and encouraging school practitioners via training and coaching from the MoEYS and involving external stakeholders, such as local businesses and academics. In the long-term, the curriculum should be more localized so that it can serve diverse needs of the communities. In the meantime, the national core curriculum still plays a crucial role in preparing students for the standardized test. Therefore, innovation leadership skills should be integrated in the existing curriculum where they are possible to be integrated.

2) Strategy 2: Transform Teaching and Learning to Develop Student Innovation Leadership Skills

The strategy comprised two substrategies and eight procedures. The term “transform” is derived from teaching and learning as weaknesses and the highest

priority need. The strategies focus on in-classroom and out-classroom learning activities, as well as learning resources. In the current situation, the ordinary schools adopt traditional teaching methods in the classroom. Teachers focus on shadow classes which provide them with additional income. In contrast, NGS schools put efforts in applying modern teaching methods, such as problem-based learning and project-based learning. Teachers are encouraged through both non-financial and financial ways. For example, a NGS school recruited a teacher with 200 US dollars in addition to his or her basic salary. In terms of non-financial motivation, teachers are closely supported by management team.

The strategy is in line with the book of Ogisu (2022), entitled “Reforming Pedagogy in Cambodia.” By looking at the book title, it can be conveyed that teaching and learning are a key issue in Cambodian education. In her book, Ogisu sought the reasons about a gap between the policy level and implementation level. As she points out, repeated negotiation and sense-making over the policy are causes of the gap. Local actors, especially teacher, negotiate and interpret the meanings of the policy what it makes sense to them. She also found that sociocultural and political contexts should be tackled because they are hindrances to the student-centered pedagogy.

The procedures centered on designing in-classroom and out-classroom learning activities by adopting experiential learning, including problem-based learning, project-based learning, cooperative/collaborative learning, and service-learning. The procedures are consistent with relevant literature. Bodolica and Spraggon (2021) suggested three types of learning activities that cultivate innovative leaders, including 1) semesterly competitions, 2) regular guest speaker invitations and monthly networking events, and 3) training, seminars, and workshops. The

competitions include the following steps: launching and announcement, preselection, shark tank (i.e., presentations of innovative idea projects; winning team selection from the preestablished shortlist; finalist announcement), project work (i.e., networking gathering with teachers, chosen teams, industry experts, and members of Shark Tank), and final selection (i.e., second shark tank to decide which team with the most inventive work will win). The following events are deemed significant for preparing next generation innovation leaders: industry challenges, networking reception, keynote speaker, and concluding reception. The topics should be trendy and interesting for students, including building task-oriented teams, brainstorming techniques, design thinking, the internet of things, and case studies of successful innovators.

In the focus group, the participants agreed that the most obvious way that can be implemented was adopting various types of teaching instead of the traditional method, which enhance students' innovation leadership skills, because as mentioned earlier the curriculum cannot be changed. This strategy is mostly supported by the stakeholders. Obviously, one of the ordinary schools is adopting project-based learning that integrate different subjects, and students can learn about teamwork and mathematics. One of awarded school directors participating in the focus group stated, "they [students] have to write a plan: how much they will spend, calculating the price...they even know about teamwork too..." It is possible to implement the strategy if school leaders have willingness to do it because the MoEYS always encourage and support them whenever they need.

3) Strategy 3: Improve Measurement and Evaluation to Develop Student Innovation Leadership Skills

The strategy included two substrategies and 11 procedures. The strategy results from the weakness of measurement and evaluation secondary to teaching and learning and the sociocultural factors as the opportunity. Thus, the active word of the strategy active was “Improve.” Besides the existing standard test, the schools need to use various types of assessments in order to evaluate students’ innovation leadership skills. The assessments conducive to innovation leadership skills include performance assessment and authentic assessment, as suggested in the strategy. In their similarity, not all performance assessments are authentic (Burrack, 2018). As teaching and learning center on problem-based and project-based learning, the performance and authentic assessments are appropriate for these types of learning. According to Curtis et al. (2020), the authentic assessment can be divided into two parts: a half of the score is given to a 10-minute live video presentation, a screencast, an animation, or another creative technique and another half is for a 1,500-word critical valuation and reflection report on the process students had commenced. This assessment can cover the skills of innovation leaders, including strategic thinking, opportunity exploration, idea generation, idea championing, and idea application.

Apart from these assessments, self-assessment and peer assessment can be suitable for innovation leadership skills of the students. As innovation leadership skills are demonstrated in behaviors, the rating scale can be used as measurement and students can assess themselves and allow peers to assess using the rating scale questionnaire. These assessments can be done after they have completed the project, in addition to the reflection report as mentioned earlier. Self-assessment can be used

for both formative and summative aims (Falchikov & Boud, 1989). They explained that it is criterion referenced, meaning that it must contain explicitly stated criteria, standards, or expectations; it involves comparisons of one's own work to those criteria, standards, or expectations. Peers might be from the same or other grades, have similar or different ability levels, and be assigned randomly, by the teacher, or by the student (Lui & Andrade, 2015).

All strategies were developed based on the holistic approach and in overall aspect, therefore each school should adjust the strategies where needed according to their contexts.

To enable the strategies to be implemented, other factors outside the scope of this study should be solved first. One of the participants in the focus group stated, “Cambodia should focus more on governance. I rate the governance as the first priority, teacher education as the second, and the participation of the community as the third or curriculum as the fourth.” The school-based management and NGS projects run by the MoEYS are the right track of education reform in response to the issues above. To challenge the status quo, schools must become self-managed, not dependent on the MoEYS for everything.

5.3 Recommendations

The following recommendations are used for implications and further research.

5.3.1 Implications

The implications for the policy makers and practitioners gained from this study are as follows.

1) The MoEYS should provide schools with more flexible support in instilling innovation leadership skills in students by creating an ecosystem for innovation and leadership or an innovation hub for each school because the current study found that all strategies need support from the MoEYS.

2) The MoEYS should help the schools become policy owners and implement the developed strategies because the current study revealed that the procedures for bringing the strategies into the implementation suggested that training and development for school directors and teachers must be done.

3) The school directors and teachers should focus on proactively developing innovation vision and strategy and innovative thinking of the students by providing students with exercising their imagination muscle and inviting them to conceive about more fixes a problem they are now facing, especially ordinary students who are not the members of student council. This study found that innovation vision and strategy and innovative thinking were the weaknesses and had low mean scores, and found that student council leaders perceived their innovation leadership skills higher than the ordinary students.

4) The school directors should develop a plan on teaching and learning for enabling teachers to adopt active learning, such as problem-based and project-based learning as this study yielded teaching and learning as the weaknesses and the top priority needs.

5) Students should practice on their own tracks in addition to the training obtained from the schools in transforming their innovative thinking because this study showed that most of the innovative thinking components had low mean scores, such as assaulting assumptions, idea generation, idea championing, and idea application.

5.3.2 Recommendations for Further Research

The following recommendations are suggested for further studies.

1) Further research should be a study of strategy implementation and evaluation as the current study developed the strategies that are yet to be implemented.

2) Future research should be a study of developing teaching and learning innovation for enhancing students' innovative thinking because this study found that teaching and learning were the weaknesses and the first priority of the need, and that innovative thinking had low mean scores.

3) Further research should a study of school leadership development and teacher development strategies or innovation for developing students' innovative thinking as this study found that school directors and teachers have low capacities to implement the strategies and found that innovative thinking had low mean scores.

4) Further research should be a study of strategies or innovation in other aspects of school management, such as human resources management, budget management, and general management to develop students' innovative thinking as the present study revealed that innovative thinking had low mean scores.

5) Further research should be a study of academic management innovation for enhancing students' innovative thinking as the current study developed academic management strategies that did not focus on design thinking as a method.

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Appendix A
List of Experts and Research Participants

List of Content Experts for Evaluating Conceptual Frameworks and Research Instruments

- | | |
|-----------------------------|---|
| 1. H.E. Kimcheang Hong, PhD | Director of Kampong Speu Institute of Technology, MoEYS |
| 2. H.E. Seang Pech, PhD | Director of Kampong Chheuteal Institute of Technology, MoEYS |
| 3. Dr. Dhirapat Kulophas | Associate Professor of Educational Management, Faculty of Education, Chulalongkorn University |
| 4. Dr. Chantheng Meak | Deputy Director of Vocational Orientation Department, MoEYS |
| 5. Dr. Marut Patphol | Head of Innovative Leaders, Center of Curriculum and learning |

List of Experts for First Draft Strategy Evaluation

- | | |
|------------------------------|--|
| 1. H.E. Kimcheang Hong, PhD | Director of Kampong Speu Institute of Technology, MoEYS |
| 2. H.E. Seang Pech, PhD | Director of Kampong Chheuteal Institute of Technology, MoEYS |
| 3. Dr. Chantheng Meak | Deputy Director of Vocational Orientation Department, MoEYS |
| 4. Dr. Chanchhaya Chhouk | Deputy Director of Teacher Training Department, MoEYS |
| 5. Dr. Panya Akkaraputtapong | Lecturer, Department of Education Policy, Management, and Leadership, Faculty of Education, Chulalongkorn University |
| 6. Dr. Sumet Ngamkanok | Associate Professor of Educational Administration, Faculty of Education, Burapha University |
| 7. Dr. Pacapol Anurit | Associate Professor of Business Administration, Bangkok Thonburi University |
| 8. Mr. Sopheak Chhum | School Director of New Generation School |
| 9. Mr. Anonymous | School Director of Awarded High School |

List of Experts and Participants in the Focus Group

Academics in Educational Management

- | | |
|-----------------------------|--|
| 1. H.E. Kimcheang Hong, PhD | Director of Kampong Speu Institute of Technology, MoEYS |
| 2. H.E. Seang Pech, PhD | Director of Kampong Chheuteal Institute of Technology, MoEYS |
| 3. Dr. Chantheng Meak | Deputy Director of Vocational Orientation |

Educational Leaders of the MoEYS

- | | |
|--------------------------|---|
| 4. H.E. Sarom Mok, PhD | Deputy Director General of Education
Directorate, MoEYS |
| 5. Dr. Chanchhaya Chhouk | Department, MoEYS
Deputy Director of Teacher Training
Department, MoEYS |
| 6. Dr. Socheath Mam | Vice Dean, Faculty of Education, Royal
University of Phnom Penh (RUPP) |
| 7. Mr. Morkoath Pring | Director of Secondary General Education
Department, MoEYS |
| 8. Mr. Chinna Ung | Director of Education Quality Assurance
Department, MoEYS |
| 9. Mr. Thy Yin | Deputy Director of Curriculum Development
Department |

Awarded/New Generation School Directors

- | | |
|-----------------------|--|
| 10. Mr. Sopheak Chhum | School Director of New Generation School |
| 11. Mr. Anonymous | School Director of Awarded High School |
| 12. Mr. Anonymous | School Director of Awarded High School |

Experts in Innovation Leadership

- | | |
|--------------------------|---|
| 13. Dr. Sopheak Song | Director of the Centre for Educational Research
and Innovation of CDRI |
| 14. Mr. Run Ul | Operation Manager of New Generation School
Project, KAPE Organization |
| 15. Mr. Chhunleng Chhorn | Chief of Board of Directors, E-School
Cambodia |
| 16. Mr. Sangha Chhoeng | Director of Amazon School and Co-founder of
Home Education |

Appendix B
Results of Content Validity Examination

Student Innovation Leadership Skills Questionnaire

Section 1: Personal Data of the Respondent

Questions	Experts					IOC	Comments or Suggestions
	1	2	3	4	5		
1. Gender: <input type="checkbox"/> Male <input type="checkbox"/> Female	+1	+1	+1	+1	+1	1	
2. Age (years old):	+1	+1	+1	+1	+1	1	
3. Grade: <input type="checkbox"/> 7th <input type="checkbox"/> 8th <input type="checkbox"/> 9th <input type="checkbox"/> 10th <input type="checkbox"/> 11th <input type="checkbox"/> 12th	+1	+1	+1	+1	+1	1	
4. Education Strand (for grade 10, 11, and 12; for grade 7, 8, and 9 please skip this question): <input type="checkbox"/> Science <input type="checkbox"/> Social Science	+1	+1	+1	+1	+1	1	
5. Student position: <input type="checkbox"/> Ordinary Student <input type="checkbox"/> Class Monitor <input type="checkbox"/> Youth Council Chief/Vice Chief <input type="checkbox"/> Others (specify):.....	+1	+1	+1	+1	+1	1	

Section 2: Innovation Leadership Skills of Secondary School Students

Operational Definitions	Items	Expert					IOC	Comments/ Suggestions
		1	2	3	4	5		
Realizing innovation vision: the ability to define and convey the innovation strategy to members, as well as build it into reality	1. I clearly define my new learning strategies.	0	+1	+1	+1	+1	.8	-I can clearly...
	2. I convert new learning strategies into specific activities.	+1	+1	+1	+1	+1	1	
	3. I invite peers to adopt specific activities of my new learning strategies.	+1	+1	+1	+1	+1	1	
Strategic thinking: the ability to perform the environmental analysis and seek learning opportunities in areas considered strategic, as well as bring a strategic perspective to the innovation process.	4. I try to do activities that widen my learning in areas considered strategic rather than accepting the learning opportunities as they arise.	+1	+1	+1	+1	+1	1	
	5. I always do a thing with purpose.	+1	+1	+1	+1	+1	1	-do something
	6. I'm constantly scanning my surroundings for clues that something has to change in my	+1	+1	+1	+1	+1	1	

Operational Definitions	Items	Expert					IOC	Comments/ Suggestions
		1	2	3	4	5		
	learning.							
	7. I develop a clear vision of what I am going to do when I finish high school through a critical analysis of surrounding trends.	+1	+1	+1	+1	+1	1	
Managing risk: the ability to identify blind spots missed previously and formulate plans to avert the risk.	8. I set a time limit for analyzing a particular situation to avoid overthinking decisions.	+1	+1	+1	+1	+1	1	
	9. I shift approach from thinking things through thoroughly toward getting started without knowing all the answers and adjusting as needed.	0	+1	+1	+1	+1	1	-toward to
	10. I always consider a risk when I do something.	+1	+1	+1	+1	+1	1	
Demonstrating curiosity: the ability to keep knowledge and skills current and actively take the initiative to learn new information, demonstrating engagement and loyalty to goals.	11. I constantly evaluate my current knowledge and skills to seek other knowledge or skills that can help achieve long-term goals.	+1	+1	+1	+1	+1	1	
	12. I foster new thinking by viewing mistakes and setbacks as learning opportunities.	+1	+1	+1	+1	+1	1	
	13. I make time for developmental activities, such as taking classes and participating in workshops.	+1	+1	+1	+1	+1	1	
Developing empathy for others: the ability to understand the end user's problems and what they want to accomplish.	14. I seek to understand others by listening deeply to what they want to accomplish, what problems they face, and how I might take on their problem when I engage in social service activities.	+1	+1	+1	+1	+1	1	
	15. I treat others with courtesy and sensitivity.	+1	+1	+1	+1	+1	1	

Operational Definitions	Items	Expert					IOC	Comments/ Suggestions
		1	2	3	4	5		
	16. I make an effort to address needs and concerns of others.	+1	+1	+1	+1	+1	1	
Opportunity exploration: the ability to identify new opportunities and/or a problem needed to be solved.	17. I am passionately alert to the possibility of transforming a vision into reality.	+1	+1	+1	+1	+1	1	
	18. I am constantly looking for new opportunities to improve my current learning.	+1	+1	+1	+1	+1	1	
	19. I pay attention to issues that are no part of my daily work and wonder how things can be improved.	+1	+1	+1	+1	+1	1	
	20. I ask valued peers to help undertake opportunities.	+1	+1	+1	+1	+1	1	
	21. I often see barriers as opportunities.	+1	+1	+1	+1	+1	1	
Assaulting assumptions: the ability to move beyond habitual thinking blocks and continuously challenge the status quo and personal, professional, and industry assumptions.	22. I move beyond habitual thinking blocks (e.g., "It's always been done that way" or "we already tried that") so that I can imagine alternative possibilities.	+1	+1	+1	+1	+1	1	
	23. I always think that "there's got to be a better way" in mind.	+1	+1	+1	+1	+1	1	
	24. I continuously challenge personal assumptions or existing rules.	+1	+1	+1	+1	+1	1	
Proactive thinking: the ability to illuminate emerging trends and turn them into new opportunities by understanding and analyzing the developments applied to their own environment.	25. I position myself to turn the surrounding trends into new opportunities by analyzing and understanding developments.	+1	+1	+1	+1	+1	1	
	26. I propose initiative to do things.	+1	+1	+1	+1	+1	1	
	27. I have always been a tremendous tool for positive change, no matter where I have been.	+1	+1	+1	+1	+1	1	-tool agent
	28. When I see	+1	+1	+1	+1	+1	1	

Operational Definitions	Items	Expert					IOC	Comments/ Suggestions
		1	2	3	4	5		
	something I don't like, I fix it.							
	29. I anticipate causes and consequences of uncertain events for good opportunities.	+1	+1	+1	+1	+1	1	
	30. I am constantly looking for new ways to improve my life.	+1	+1	+1	+1	+1	1	
Idea generation: the ability to use own novel thinking capabilities and support members to generate ideas on innovation through various techniques.	31. I ideate or invite ideas on purpose through some techniques such as brainstorming and mind-mapping.	+1	+1	+1	+1	+1	1	
	32. I encourage peers to the idea generation process.	+1	+1	+1	+1	+1	1	
	33. I engage in activities more usually associated with leadership or entrepreneurship.	+1	+1	+1	+1	+1	1	
	34. I hold two opposing ideas in the mind at the same time and open to a third solution when discussing on a problem.	+1	+1	+1	+1	+1	1	
	35. I prefer to try new ways of approaching a problem rather than accepted ways.	+1	+1	+1	+1	+1	1	
	36. I often fantasize about impossible things.	+1	+1	+1	+1	+1	1	
	Idea championing: the ability to sell a new idea through personal commitment, persuasive communication, as well as potential alliances.	37. I attempt to convince other people to support my innovative ideas through contacts.	+1	+1	+1	+1	+1	1
38. I make my peers enthusiastic for innovative ideas.		+1	+1	+1	+1	+1	1	
39. I engage in promotional activities to gather both social and financial resources for making my novel idea happen.		+1	+1	+1	+1	+1	1	
Idea application: the	40. I set a meeting with my peers to	+1	+1	+1	+1	+1	1	

Operational Definitions	Items	Expert					IOC	Comments/ Suggestions
		1	2	3	4	5		
ability to bring the new supported idea into practice and make innovation a regular part of daily operation.	outline the value of change or improvements in the school on an ongoing basis.							
	41. I engage in networking opportunities that appeal to my peers.	+1	+1	+1	+1	+1	1	
	42. I systematically introduce innovative ideas into practices.	+1	+1	+1	+1	+1	1	
	43. I contribute to the implementation of new ideas.	+1	+1	+1	+1	+1	1	
	44. I put effort in the development of new things.	+1	+1	+1	+1	+1	1	
Leading courageously: the ability to lead with confidence and authority, accept responsibility for making challenging decisions, engage and maintain audience attention in high-stakes meetings and discussions, as well as do not avoid conflicts and differences of opinion.	45. I prepare to deal with other people's reactions when facing a tough decision.	+1	+1	+1	+1	+1	1	
	46. I look for an opportunity to share feelings and opinions with clarity and conviction, despite any resistance that happens to occur.	+1	+1	+1	+1	+1	1	
	47. I am assertive rather than being aggressive.	+1	+1	+1	+1	+1	1	
Leading by example: the ability to act as a role model and unconventionally related to innovation that causes members to engage in such behaviors.	48. I have commitment to the implementation of new ideas through various behaviors and activities.	+1	+1	+1	+1	+1	1	
	49. I demonstrate surprising behaviors (but acceptable) to my peers.	+1	+1	+1	+1	+1	1	
	50. I take a risk in implementing my new idea so that others can observe and follow.	+1	+1	+1	+1	+1	1	
	51. I have confidence in my team members'	+1	+1	+1	+1	+1	1	

Operational Definitions	Items	Expert					IOC	Comments/ Suggestions
		1	2	3	4	5		
	contributions to implement new ideas when doing a group work.							
Promoting a culture of trust: the ability to believe in members and embrace failure on innovation, as well as eliminate challenges to innovation creation faced by members.	52. I embrace failure as a natural part of the implementation of new ideas.	+1	+1	+1	+1	+1	1	
	53. I encourage peers to stick to their ideas.	+1	+1	+1	+1	+1	1	
	54. I find a way to help peers overcome the challenges they face.	+1	+1	+1	+1	+1	1	
Recognizing the innovators: the ability to use a reward system for contributing to innovation.	55. I support and motivate peers to participate in social service activities to make change.	+1	+1	+1	+1	+1	1	
	56. I consistently recognize innovative performance of my group members.	+1	+1	+1	+1	+1	1	
	57. I provide group members with opportunities to implement their new ideas.	+1	+1	+1	+1	+1	1	
	58. I reward rather than punish innovative attempts of group members.	+1	+1	+1	+1	+1	1	

CHULALONGKORN UNIVERSITY

Questionnaire on Current and Desirable States of Academic Management Based on the Concept of Innovation Leadership Skills

Section 1: Personal Data of the Respondent

Questions	Experts					IOC	Comments or Suggestions
	1	2	3	4	5		
1. Gender: <input type="checkbox"/> Male <input type="checkbox"/> Female	+1	+1	+1	+1	+1	1	
2. Age (years old):	+1	+1	+1	+1	+1	1	
3. Highest Education Level: <input type="checkbox"/> Associate <input type="checkbox"/> Bachelor <input type="checkbox"/> Master <input type="checkbox"/> Doctoral <input type="checkbox"/> Others (please specify):.....	+1	+1	+1	+1	+1	1	
4. Work experience in the current position (years):	+1	+1	+1	+1	+1	1	

<input type="checkbox"/> less than/equal to 5 <input type="checkbox"/> 6-10 <input type="checkbox"/> 11-15 <input type="checkbox"/> 16-20 <input type="checkbox"/> greater than 20								
5. Current Position: <input type="checkbox"/> Director <input type="checkbox"/> Vice Director <input type="checkbox"/> Teacher	+1	+1	+1	+1	+1	1		
For school directors/vice school directors:								
6. What is the total number of classes in the school? <input type="checkbox"/> less than/equal to 20 <input type="checkbox"/> 21-40 <input type="checkbox"/> greater than 41	+1	+1	+1	+1	+1	1		
For teachers:								
7. What subject do you teach? Answer:	+1	+1	+1	+1	+1	1		
8. What grade do you teach? <input type="checkbox"/> 7th <input type="checkbox"/> 8th <input type="checkbox"/> 9th <input type="checkbox"/> 10th <input type="checkbox"/> 11th <input type="checkbox"/> 12th	+1	+1	+1	+1	+1	1		
9. In what education strand is your class in? (for grade 10, 11, and 12; for grade 7, 8, and 9 please skip this question) <input type="checkbox"/> Science <input type="checkbox"/> Social Science	+1	+1	+1	+1	+1	1		

Section 2: Current and Desirable States of Academic Management based on the Concept of Innovation Leadership Skills

Operational Definitions	Items	Expert					IOC	Comments/Suggestions
		1	2	3	4	5		
Curriculum development: Identifying learning outcomes in the curriculum and using learning outcomes in course development to develop the students' innovation leadership skills.	1. At what level does your school <i>identify learning outcomes</i> in the curriculum to develop students' innovation leadership skills as follows?							
	1.1 Realizing innovation vision	+1	+1	+1	+1	+1	1	
	1.2 Strategic thinking	+1	+1	+1	+1	+1	1	
	1.3 Managing risk	+1	+1	+1	+1	+1	1	
	1.4 Demonstrating curiosity	+1	+1	+1	+1	+1	1	
	1.5 Developing empathy for others	+1	+1	+1	+1	+1	1	
	1.6 Opportunity exploration	+1	+1	+1	+1	+1	1	
	1.7 Assaulting assumptions	+1	+1	+1	+1	+1	1	
	1.8 Proactive thinking	+1	+1	+1	+1	+1	1	
	1.9 Idea generation	+1	+1	+1	+1	+1	1	
	1.10 Idea championing	+1	+1	+1	+1	+1	1	
	1.11 Idea application	+1	+1	+1	+1	+1	1	
	1.12 Leading courageously	+1	+1	+1	+1	+1	1	
	1.13 Leading by example	+1	+1	+1	+1	+1	1	
	1.14 Promoting a culture of trust	+1	+1	+1	+1	+1	1	
1.15 Recognizing the innovators	+1	+1	+1	+1	+1	1		

Operational Definitions	Items	Expert					IOC	Comments/ Suggestions
		1	2	3	4	5		
	2. At what level does your school <i>use learning outcomes</i> in course development to develop students' innovation leadership skills as follows?							
	2.1 Realizing innovation vision	+1	+1	+1	+1	+1	1	
	2.2 Strategic thinking	+1	+1	+1	+1	+1	1	
	2.3 Managing risk	+1	+1	+1	+1	+1	1	
	2.4 Demonstrating curiosity	+1	+1	+1	+1	+1	1	
	2.5 Developing empathy for others	+1	+1	+1	+1	+1	1	
	2.6 Opportunity exploration	+1	+1	+1	+1	+1	1	
	2.7 Assaulting assumptions	+1	+1	+1	+1	+1	1	
	2.8 Proactive thinking	+1	+1	+1	+1	+1	1	
	2.9 Idea generation	+1	+1	+1	+1	+1	1	
	2.10 Idea championing	+1	+1	+1	+1	+1	1	
	2.11 Idea application	+1	+1	+1	+1	+1	1	
	2.12 Leading courageously	+1	+1	+1	+1	+1	1	
	2.13 Leading by example	+1	+1	+1	+1	+1	1	
	2.14 Promoting a culture of trust	+1	+1	+1	+1	+1	1	
	2.15 Recognizing the innovators	+1	+1	+1	+1	+1	1	
Teaching and learning:	3. At what level does your school <i>use learning media and resources</i> in teaching and learning to develop students' innovation leadership skills as follows?							
Using learning media and resources and organizing learning activities to develop the students' innovation leadership skills.	3.1 Realizing innovation vision	+1	+1	+1	+1	+1	1	
	3.2 Strategic thinking	+1	+1	+1	+1	+1	1	
	3.3 Managing risk	+1	+1	+1	+1	+1	1	
	3.4 Demonstrating curiosity	+1	+1	+1	+1	+1	1	
	3.5 Developing empathy for others	+1	+1	+1	+1	+1	1	
	3.6 Opportunity exploration	+1	+1	+1	+1	+1	1	
	3.7 Assaulting assumptions	+1	+1	+1	+1	+1	1	
	3.8 Proactive thinking	+1	+1	+1	+1	+1	1	
	3.9 Idea generation	+1	+1	+1	+1	+1	1	
	3.10 Idea championing	+1	+1	+1	+1	+1	1	
	3.11 Idea application	+1	+1	+1	+1	+1	1	
	3.12 Leading courageously	+1	+1	+1	+1	+1	1	
	3.13 Leading by example	+1	+1	+1	+1	+1	1	
	3.14 Promoting a culture of trust	+1	+1	+1	+1	+1	1	
	3.15 Recognizing the innovators	+1	+1	+1	+1	+1	1	
	4. At what level does your school <i>organize learning activities</i> in teaching and learning to develop students' innovation leadership skills as follows?							
	4.1 Realizing innovation vision	+1	+1	+1	+1	+1	1	
	4.2 Strategic thinking	+1	+1	+1	+1	+1	1	

Operational Definitions	Items	Expert					IOC	Comments/ Suggestions
		1	2	3	4	5		
	4.3 Managing risk	+1	+1	+1	+1	+1	1	
	4.4 Demonstrating curiosity	+1	+1	+1	+1	+1	1	
	4.5 Developing Empathy for others	+1	+1	+1	+1	+1	1	
	4.6 Opportunity exploration	+1	+1	+1	+1	+1	1	
	4.7 Assaulting assumptions	+1	+1	+1	+1	+1	1	
	4.8 Proactive thinking	+1	+1	+1	+1	+1	1	
	4.9 Idea generation	+1	+1	+1	+1	+1	1	
	4.10 Idea championing	+1	+1	+1	+1	+1	1	
	4.11 Idea application	+1	+1	+1	+1	+1	1	
	4.12 Leading courageously	+1	+1	+1	+1	+1	1	
	4.13 Leading by example	+1	+1	+1	+1	+1	1	
	4.14 Promoting a culture of trust	+1	+1	+1	+1	+1	1	
	4.15 Recognizing the innovators	+1	+1	+1	+1	+1	1	
Measurement and evaluation: Setting evaluation criteria and constructing measuring tools and assessing learning outcomes to develop the students' innovation leadership skills.	5. At what level does your school measure and evaluate students' learning outcomes related to students' innovation leadership skills as follows?							
	5.1 Realizing innovation vision	+1	+1	+1	+1	+1	1	
	5.2 Strategic thinking	+1	+1	+1	+1	+1	1	
	5.3 Managing risk	+1	+1	+1	+1	+1	1	
	5.4 Demonstrating curiosity	+1	+1	+1	+1	+1	1	
	5.5 Developing empathy for others	+1	+1	+1	+1	+1	1	
	5.6 Opportunity exploration	+1	+1	+1	+1	+1	1	
	5.7 Assaulting assumptions	+1	+1	+1	+1	+1	1	
	5.8 Proactive thinking	+1	+1	+1	+1	+1	1	
	5.9 Idea generation	+1	+1	+1	+1	+1	1	
	5.10 Idea championing	+1	+1	+1	+1	+1	1	
	5.11 Idea application	+1	+1	+1	+1	+1	1	
	5.12 Leading courageously	+1	+1	+1	+1	+1	1	
	5.13 Leading by example	+1	+1	+1	+1	+1	1	
	5.14 Promoting a culture of trust	+1	+1	+1	+1	+1	1	
5.15 Recognizing the innovators	+1	+1	+1	+1	+1	1		

Section 3: External Environment of Academic Management Based on the Concept of Innovation Leadership Skills

Items	Expert					IOC	Comments/ Suggestions
	1	2	3	4	5		
Political-Legal (P): such as political situations, government and ministry policies, educational decrees / sub-decrees / declaration							
1. At what level do <i>politics and legal factors</i> enable curriculum development to develop							

Items	Expert					IOC	Comments/ Suggestions
	1	2	3	4	5		
students' innovation leadership skills as follows?							
1.1 Realizing innovation vision	+1	+1	+1	+1	+1	1	
1.2 Strategic thinking	+1	+1	+1	+1	+1	1	
1.3 Managing risk	+1	+1	+1	+1	+1	1	
1.4 Demonstrating curiosity	+1	+1	+1	+1	+1	1	
1.5 Developing empathy for others	+1	+1	+1	+1	+1	1	
1.6 Opportunity exploration	+1	+1	+1	+1	+1	1	
1.7 Assaulting assumptions	+1	+1	+1	+1	+1	1	
1.8 Proactive thinking	+1	+1	+1	+1	+1	1	
1.9 Idea generation	+1	+1	+1	+1	+1	1	
1.10 Idea championing	+1	+1	+1	+1	+1	1	
1.11 Idea application	+1	+1	+1	+1	+1	1	
1.12 Leading courageously	+1	+1	+1	+1	+1	1	
1.13 Leading by example	+1	+1	+1	+1	+1	1	
1.14 Promoting a culture of trust	+1	+1	+1	+1	+1	1	
1.15 Recognizing the innovators	+1	+1	+1	+1	+1	1	
2. At what level do <i>politics and legal factors</i> enable teaching and learning to develop students' innovation leadership skills as follows?							
2.1 Realizing innovation vision	+1	+1	+1	+1	+1	1	
2.2 Strategic thinking	+1	+1	+1	+1	+1	1	
2.3 Managing risk	+1	+1	+1	+1	+1	1	
2.4 Demonstrating curiosity	+1	+1	+1	+1	+1	1	
2.5 Developing empathy for others	+1	+1	+1	+1	+1	1	
2.6 Opportunity exploration	+1	+1	+1	+1	+1	1	
2.7 Assaulting assumptions	+1	+1	+1	+1	+1	1	
2.8 Proactive thinking	+1	+1	+1	+1	+1	1	
2.9 Idea generation	+1	+1	+1	+1	+1	1	
2.10 Idea championing	+1	+1	+1	+1	+1	1	
2.11 Idea application	+1	+1	+1	+1	+1	1	
2.12 Leading courageously	+1	+1	+1	+1	+1	1	
2.13 Leading by example	+1	+1	+1	+1	+1	1	
2.14 Promoting a culture of trust	+1	+1	+1	+1	+1	1	
2.15 Recognizing the innovators	+1	+1	+1	+1	+1	1	
3. At what level do <i>politics and legal factors</i> enable measurement and evaluation on students' learning outcomes related to students' innovation leadership skills as follows?							
3.1 Realizing innovation vision	+1	+1	+1	+1	+1	1	
3.2 Strategic thinking	+1	+1	+1	+1	+1	1	
3.3 Managing risk	+1	+1	+1	+1	+1	1	
3.4 Demonstrating curiosity	+1	+1	+1	+1	+1	1	
3.5 Developing empathy for others	+1	+1	+1	+1	+1	1	
3.6 Opportunity exploration	+1	+1	+1	+1	+1	1	
3.7 Assaulting assumptions	+1	+1	+1	+1	+1	1	

Items	Expert					IOC	Comments/ Suggestions
	1	2	3	4	5		
3.8 Proactive thinking	+1	+1	+1	+1	+1	1	
3.9 Idea generation	+1	+1	+1	+1	+1	1	
3.10 Idea championing	+1	+1	+1	+1	+1	1	
3.11 Idea application	+1	+1	+1	+1	+1	1	
3.12 Leading courageously	+1	+1	+1	+1	+1	1	
3.13 Leading by example	+1	+1	+1	+1	+1	1	
3.14 Promoting a culture of trust	+1	+1	+1	+1	+1	1	
3.15 Recognizing the innovators	+1	+1	+1	+1	+1	1	
4. At what level do <i>economic factors</i> enable curriculum development to develop students' innovation leadership skills as follows?							
4.1 Realizing innovation vision	+1	+1	+1	+1	+1	1	
4.2 Strategic thinking	+1	+1	+1	+1	+1	1	
4.3 Managing risk	+1	+1	+1	+1	+1	1	
4.4 Demonstrating curiosity	+1	+1	+1	+1	+1	1	
4.5 Developing Empathy for others	+1	+1	+1	+1	+1	1	
4.6 Opportunity exploration	+1	+1	+1	+1	+1	1	
4.7 Assaulting assumptions	+1	+1	+1	+1	+1	1	
4.8 Proactive thinking	+1	+1	+1	+1	+1	1	
4.9 Idea generation	+1	+1	+1	+1	+1	1	
4.10 Idea championing	+1	+1	+1	+1	+1	1	
4.11 Idea application	+1	+1	+1	+1	+1	1	
4.12 Leading courageously	+1	+1	+1	+1	+1	1	
4.13 Leading by example	+1	+1	+1	+1	+1	1	
4.14 Promoting a culture of trust	+1	+1	+1	+1	+1	1	
4.15 Recognizing the innovators	+1	+1	+1	+1	+1	1	
Economic Factors (E): such as economic situations, national budget, investment, and employment							
5. At what level do <i>economic factors</i> enable teaching and learning to develop students' innovation leadership skills as follows?							
5.1 Realizing innovation vision	+1	+1	+1	+1	+1	1	
5.2 Strategic thinking	+1	+1	+1	+1	+1	1	
5.3 Managing risk	+1	+1	+1	+1	+1	1	
5.4 Demonstrating curiosity	+1	+1	+1	+1	+1	1	
5.5 Developing empathy for others	+1	+1	+1	+1	+1	1	
5.6 Opportunity exploration	+1	+1	+1	+1	+1	1	
5.7 Assaulting assumptions	+1	+1	+1	+1	+1	1	
5.8 Proactive thinking	+1	+1	+1	+1	+1	1	
5.9 Idea generation	+1	+1	+1	+1	+1	1	
5.10 Idea championing	+1	+1	+1	+1	+1	1	
5.11 Idea application	+1	+1	+1	+1	+1	1	
5.12 Leading courageously	+1	+1	+1	+1	+1	1	
5.13 Leading by example	+1	+1	+1	+1	+1	1	

Items	Expert					IOC	Comments/ Suggestions
	1	2	3	4	5		
5.14 Promoting a culture of trust	+1	+1	+1	+1	+1	1	
5.15 Recognizing the innovators	+1	+1	+1	+1	+1	1	
6. At what level do <i>economic factors</i> enable measurement and evaluation on students' learning outcomes related to students' innovation leadership skills as follows?							
6.1 Realizing innovation vision	+1	+1	+1	+1	+1	1	
6.2 Strategic thinking	+1	+1	+1	+1	+1	1	
6.3 Managing risk	+1	+1	+1	+1	+1	1	
6.4 Demonstrating curiosity	+1	+1	+1	+1	+1	1	
6.5 Developing empathy for others	+1	+1	+1	+1	+1	1	
6.6 Opportunity exploration	+1	+1	+1	+1	+1	1	
6.7 Assaulting assumptions	+1	+1	+1	+1	+1	1	
6.8 Proactive thinking	+1	+1	+1	+1	+1	1	
6.9 Idea generation	+1	+1	+1	+1	+1	1	
6.10 Idea championing	+1	+1	+1	+1	+1	1	
6.11 Idea application	+1	+1	+1	+1	+1	1	
6.12 Leading courageously	+1	+1	+1	+1	+1	1	
6.13 Leading by example	+1	+1	+1	+1	+1	1	
6.14 Promoting a culture of trust	+1	+1	+1	+1	+1	1	
6.15 Recognizing the innovators	+1	+1	+1	+1	+1	1	
Socio-Cultural Factors (S): such as educational system, family and community background, ethnic and religion, values, beliefs, and social organizations							
7. At what level do <i>socio-cultural factors</i> enable curriculum development to develop students' innovation leadership skills as follows?							
7.1 Realizing innovation vision	+1	+1	+1	+1	+1	1	
7.2 Strategic thinking	+1	+1	+1	+1	+1	1	
7.3 Managing risk	+1	+1	+1	+1	+1	1	
7.4 Demonstrating curiosity	+1	+1	+1	+1	+1	1	
7.5 Developing Empathy for others	+1	+1	+1	+1	+1	1	
7.6 Opportunity exploration	+1	+1	+1	+1	+1	1	
7.7 Assaulting assumptions	+1	+1	+1	+1	+1	1	
7.8 Proactive thinking	+1	+1	+1	+1	+1	1	
7.9 Idea generation	+1	+1	+1	+1	+1	1	
7.10 Idea championing	+1	+1	+1	+1	+1	1	
7.11 Idea application	+1	+1	+1	+1	+1	1	
7.12 Leading courageously	+1	+1	+1	+1	+1	1	
7.13 Leading by example	+1	+1	+1	+1	+1	1	
7.14 Promoting a culture of trust	+1	+1	+1	+1	+1	1	
7.15 Recognizing the innovators	+1	+1	+1	+1	+1	1	
8. At what level do <i>socio-cultural factors</i> enable teaching and learning to develop students' innovation leadership skills as follows?							
8.1 Realizing innovation vision	+1	+1	+1	+1	+1	1	
8.2 Strategic thinking	+1	+1	+1	+1	+1	1	

Items	Expert					IOC	Comments/ Suggestions
	1	2	3	4	5		
8.3 Managing risk	+1	+1	+1	+1	+1	1	
8.4 Demonstrating curiosity	+1	+1	+1	+1	+1	1	
8.5 Developing empathy for others	+1	+1	+1	+1	+1	1	
8.6 Opportunity exploration	+1	+1	+1	+1	+1	1	
8.7 Assaulting assumptions	+1	+1	+1	+1	+1	1	
8.8 Proactive thinking	+1	+1	+1	+1	+1	1	
8.9 Idea generation	+1	+1	+1	+1	+1	1	
8.10 Idea championing	+1	+1	+1	+1	+1	1	
8.11 Idea application	+1	+1	+1	+1	+1	1	
8.12 Leading courageously	+1	+1	+1	+1	+1	1	
8.13 Leading by example	+1	+1	+1	+1	+1	1	
8.14 Promoting a culture of trust	+1	+1	+1	+1	+1	1	
8.15 Recognizing the innovators	+1	+1	+1	+1	+1	1	
9. At what level do <i>socio-cultural factors</i> enable measurement and evaluation on students' learning outcomes related to students' innovation leadership skills as follows?							
9.1 Realizing innovation vision	+1	+1	+1	+1	+1	1	
9.2 Strategic thinking	+1	+1	+1	+1	+1	1	
9.3 Managing risk	+1	+1	+1	+1	+1	1	
9.4 Demonstrating curiosity	+1	+1	+1	+1	+1	1	
9.5 Developing empathy for others	+1	+1	+1	+1	+1	1	
9.6 Opportunity exploration	+1	+1	+1	+1	+1	1	
9.7 Assaulting assumptions	+1	+1	+1	+1	+1	1	
9.8 Proactive thinking	+1	+1	+1	+1	+1	1	
9.9 Idea generation	+1	+1	+1	+1	+1	1	
9.10 Idea championing	+1	+1	+1	+1	+1	1	
9.11 Idea application	+1	+1	+1	+1	+1	1	
9.12 Leading courageously	+1	+1	+1	+1	+1	1	
9.13 Leading by example	+1	+1	+1	+1	+1	1	
9.14 Promoting a culture of trust	+1	+1	+1	+1	+1	1	
9.15 Recognizing the innovators	+1	+1	+1	+1	+1	1	
Technological Factors (T): such as technological advancement and innovations, internet, automation, and online learning tools							
10. At what level do <i>technological factors</i> enable curriculum development to develop students' innovation leadership skills as follows?							
10.1 Realizing innovation vision	+1	+1	+1	+1	+1	1	
10.2 Strategic thinking	+1	+1	+1	+1	+1	1	
10.3 Managing risk	+1	+1	+1	+1	+1	1	
10.4 Demonstrating curiosity	+1	+1	+1	+1	+1	1	
10.5 Developing empathy for others	+1	+1	+1	+1	+1	1	
10.6 Opportunity exploration	+1	+1	+1	+1	+1	1	
10.7 Assaulting assumptions	+1	+1	+1	+1	+1	1	

Items	Expert					IOC	Comments/ Suggestions
	1	2	3	4	5		
10.8 Proactive thinking	+1	+1	+1	+1	+1	1	
10.9 Idea generation	+1	+1	+1	+1	+1	1	
10.10 Idea championing	+1	+1	+1	+1	+1	1	
10.11 Idea application	+1	+1	+1	+1	+1	1	
10.12 Leading courageously	+1	+1	+1	+1	+1	1	
10.13 Leading by example	+1	+1	+1	+1	+1	1	
10.14 Promoting a culture of trust	+1	+1	+1	+1	+1	1	
10.15 Recognizing the innovators	+1	+1	+1	+1	+1	1	
11. At what level do <i>technological factors</i> enable teaching and learning to develop students' innovation leadership skills as follows?							
11.1 Realizing innovation vision	+1	+1	+1	+1	+1	1	
11.2 Strategic thinking	+1	+1	+1	+1	+1	1	
11.3 Managing risk	+1	+1	+1	+1	+1	1	
11.4 Demonstrating curiosity	+1	+1	+1	+1	+1	1	
11.5 Developing empathy for others	+1	+1	+1	+1	+1	1	
11.6 Opportunity exploration	+1	+1	+1	+1	+1	1	
11.7 Assaulting assumptions	+1	+1	+1	+1	+1	1	
11.8 Proactive thinking	+1	+1	+1	+1	+1	1	
11.9 Idea generation	+1	+1	+1	+1	+1	1	
11.10 Idea championing	+1	+1	+1	+1	+1	1	
11.11 Idea application	+1	+1	+1	+1	+1	1	
11.12 Leading courageously	+1	+1	+1	+1	+1	1	
11.13 Leading by example	+1	+1	+1	+1	+1	1	
11.14 Promoting a culture of trust	+1	+1	+1	+1	+1	1	
11.15 Recognizing the innovators	+1	+1	+1	+1	+1	1	
12. At what level do <i>technological factors</i> enable measurement and evaluation on students' learning outcomes related to students' innovation leadership skills as follows?							
12.1 Realizing innovation vision	+1	+1	+1	+1	+1	1	
12.2 Strategic thinking	+1	+1	+1	+1	+1	1	
12.3 Managing risk	+1	+1	+1	+1	+1	1	
12.4 Demonstrating curiosity	+1	+1	+1	+1	+1	1	
12.5 Developing empathy for others	+1	+1	+1	+1	+1	1	
12.6 Opportunity exploration	+1	+1	+1	+1	+1	1	
12.7 Assaulting assumptions	+1	+1	+1	+1	+1	1	
12.8 Proactive thinking	+1	+1	+1	+1	+1	1	
12.9 Idea generation	+1	+1	+1	+1	+1	1	
12.10 Idea championing	+1	+1	+1	+1	+1	1	
12.11 Idea application	+1	+1	+1	+1	+1	1	
12.12 Leading courageously	+1	+1	+1	+1	+1	1	
12.13 Leading by example	+1	+1	+1	+1	+1	1	

Items	Expert					IOC	Comments/ Suggestions
	1	2	3	4	5		
12.14 Promoting a culture of trust	+1	+1	+1	+1	+1	1	
12.15 Recognizing the innovators	+1	+1	+1	+1	+1	1	



Appendix C
Research Instrument Revision

Components/Items	Item Revisions After Tryout
1. Realizing innovation vision ($\alpha = .551$)	
I can clearly define my new learning strategies.	I can clearly define new proactive approaches in my learning to achieve my goals.
I convert new learning strategies into specific activities for implementation.	I can easily translate new proactive approaches to learning into specific activities that I can easily implement in order to achieve my goals.
	I can clearly explain to my group members the purpose of the assigned group work. (New item)
I invite peers to adopt specific activities of my new learning strategies.	When doing group work, I can communicate with my group members to put effort into realizing and achieving a shared goal.
	When doing group work, I regularly hold meetings with my group members to ensure they are aligned with the shared goal. (New item)
2. Strategic thinking ($\alpha = .694$)	
I try to do activities that widen my learning in areas considered strategic rather than accepting the learning opportunities as they arise.	
I always do something with purpose.	
I'm constantly scanning my surroundings for clues that something has to change in my learning.	
I develop a clear vision of what I am going to do when I finish high school through a critical analysis of surrounding trends.	I constantly analyze my strengths and weaknesses to improve my learning.
	I compare my learning performance to my peers to improve my learning. (New item)
3. Managing Risk ($\alpha = .517$)	
	Despite embracing new initiatives, I initiate reasonable action when potentially negative consequences are expected. (New item)
I set a time limit for analyzing a particular situation to avoid overthinking decisions.	Although I am typically bold in decision-making situations with uncertainty, I spend time analyzing a particular situation to avoid overthinking decisions.
I shift my approach from thinking things through thoroughly toward getting started without knowing all the answers and adjusting as needed.	Although I am a risk-taker, I identify any potential risks in every decision.
I always consider a risk when I do something.	Although I like doing new projects, I anticipate the possibility of something bad that might happen in those projects.
	I develop plans to minimize risks (unpleasant things possibly happening) when doing new projects. (New item)
4. Demonstrating Curiosity ($\alpha = .447$)	
I constantly evaluate my current knowledge and skills to seek other knowledge or skills that can help achieve long-term goals.	I constantly evaluate my current knowledge and skills.
	I seek other knowledge or skills that can help achieve long-term goals.
I foster new thinking by viewing mistakes and setbacks as learning opportunities.	I view mistakes and setbacks as learning opportunities.

Components/Items	Item Revisions After Tryout
I make time for developmental activities, such as taking classes and participating in workshops.	
	I put effort in making my learning better. (New item)
	I constantly ask questions to broaden my knowledge and skills. (New item)
	I am enthusiastic about learning. (New item)
5. Developing Empathy for Others ($\alpha = .627$)	
I seek to understand others by listening deeply to what they want to accomplish, what problems they face, and how I might take on their problem when I engage in social service activities.	
I treat others with courtesy and sensitivity.	
I make an effort to address needs and concerns of others.	
6. Opportunity Exploration ($\alpha = .661$)	
I am passionately alert to the possibility of transforming a vision into reality.	I am passionately alert to the possibility of transforming my long-term goals into reality.
I am constantly looking for new opportunities to improve my current learning.	I am constantly looking for new opportunities to improve my learning.
I pay attention to issues that are no part of my daily work, and wonder how things can be improved.	
I ask valued peers to help undertake opportunities.	
I often see barriers as opportunities.	
7. Assaulting assumptions ($\alpha = .515$)	
I move beyond habitual thinking blocks (e.g., "It's always been done that way" or "we already tried that") so that I can imagine alternative possibilities.	I move beyond habitual thinking blocks (e.g. habitual thinking blocks include "It's always been done that way" or "we already tried that").
I always think that "there's got to be a better way" in mind.	
I continuously challenge personal assumptions or existing rules.	If I personally have different ideas from the teacher, school management team, or other seniors, I find ways to communicate that without damaging the relationships.
	I like asking what-if and why/why-not questions (e.g., "Why don't they do it this other way?" or "What if we try a different approach to solving this problem?"). (New item)
	I am open to new ideas even though those ideas are opposed to existing practices. (New item)
8. Proactive thinking ($\alpha = .753$)	
I position myself to turn the surrounding trends into new opportunities by analyzing and understanding developments.	
I propose the initiative to do something new.	
I have always been an agent for positive change, no matter where I have been.	

Components/Items	Item Revisions After Tryout
When I see something I don't like, I fix it.	When I see something awkward, I fix it.
I anticipate causes and consequences of uncertain events for good opportunities.	
I am constantly looking for new ways to improve my life.	
9. Idea generation ($\alpha = .665$)	
I ideate or invite ideas on purpose through some techniques such as brainstorming and mind-mapping.	I intentionally generate ideas by brainstorming and mind-mapping when doing group work or in meetings.
I encourage peers to the idea generation process.	
I engage in activities more usually associated with leadership or entrepreneurship.	
I hold two opposing ideas in the mind at the same time and open to a third solution when discussing on a problem.	
I prefer to try new ways of approaching a problem rather than accepted ways.	I prefer to try new ways of solving a problem rather than accepted ways.
I often fantasize about impossible things.	
10. Idea Championing ($\alpha = .784$)	
I attempt to convince other people to support my innovative ideas through contacts.	
I make my peers enthusiastic for innovative ideas.	
I engage in promotional activities to gather both social (such as networks with peers or organizations) and financial resources for making my novel idea happen.	
11. Idea Application ($\alpha = .850$)	
I set a meeting with my peers to outline the value of change or improvements in the school on an ongoing basis.	
I engage in networking opportunities that appeal to my peers.	I engage in networking opportunities.
I systematically introduce innovative ideas into practices.	
I contribute to the implementation of new ideas.	
I put effort in the development of new things.	
12. Leading courageously ($\alpha = .730$)	
I prepare to deal with other people's reactions when facing a tough decision.	
I look for an opportunity to share feelings and opinions with clarity and conviction, despite any resistance that happens to occur.	
I am assertive rather than being aggressive.	
13. Leading by example ($\alpha = .659$)	
I have commitment to the implementation of new ideas through various behaviors and activities.	When doing group work or engaging in social-service activities, I show commitment to the implementation of new ideas through various behaviors and actions.
I demonstrate surprising behaviors (but acceptable) to my peers.	If I am a team leader, I take blames on behalf of my team members in implementing any new idea or project.

Components/Items	Item Revisions After Tryout
I take a risk in implementing my new idea so that others can observe and follow.	When I want surrounding people to follow my new idea, I do it first as an example.
14. Promoting culture of trust ($\alpha = .619$)	
I have confidence in my team members' contributions to implement new ideas when doing a group work.	I show confidence in my team members' contributions to implement new ideas when doing a group work.
I embrace failure as a natural part of the implementation of new ideas.	
I encourage peers to stick to their ideas.	
I find a way to help peers overcome the challenges they face.	
15. Recognizing the innovators ($\alpha = .785$)	
I support and motivate peers to participate in social service activities to make change.	
I consistently recognize innovative performance of my group members.	I praise my group members for expressing new and good ideas when doing group work.
I provide group members with opportunities to implement their new ideas.	
I reward rather than punish innovative attempts of group members.	I reward rather than punish innovative attempts by group members.

Appendix D
Research Instruments
Innovation Leadership Skills Questionnaire



Questionnaire

“Innovation Leadership Skills”

Instruction:

1. This questionnaire is part of the doctoral program in Educational Management and is conducted to answer the second research objective of the above-mentioned dissertation title, “*to study levels of innovation leadership skills of the secondary school students.*”

2. The questionnaire consists of three sections as follows:

Section 1: Personal data of the respondent

Section 2: Innovation leadership skills

Section 3: Open-ended questions

3. The questionnaire will take about 30 minutes. Your participation is voluntary. Your returned questionnaire will be considered for your participation in this study.

4. Please remember that all your responses will be kept confidential, private, and anonymous, and the results will be interpreted as a whole, not individually. The data will be deleted one year after graduation.

5. Thank you for taking the time to fill out this questionnaire.

Mr. Nguon Siek

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Faculty of Education, Chulalongkorn University

Contact:

Tel: xxx-xxx-xxx

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Section 1: Personal Data of the Respondents

Instruction: Please tick (✓) in the box that is true for you or fill in the space provided.

1. Gender: Male Female
2. Age (years old):.....
3. Grade: 7th 8th 9th 10th 11th 12th
4. Education Strand (for grade 10, 11, and 12; for grade 7, 8, and 9 please skip this question):
 Science Social Science
5. Student position: normal student Class Monitor
 Youth Council Chief/Vice Chief Others (specify):.....

Section 2: Innovation Leadership Skills

Instruction: Please read the following statements and tick (✓) in column number 1, 2, 3, 4, or 5 at the end of each statement that is true for you as follows:

- 5 refers to you "strongly agree" with the statement
- 4 refers to you "agree" with the statement
- 3 refers to you are "neither agree nor disagree" with the statement
- 2 refers to you "disagree" with the statement
- 1 refers to you "strongly disagree" with the statement

No.	Statements	Strongly Disagree→Strongly Agree				
		1	2	3	4	5
1	I can clearly define new proactive approaches in my learning to achieve my goals.	1	2	3	4	5
2	I can easily translate new proactive approaches to learning into specific activities that I can easily implement in order to achieve my goals.	1	2	3	4	5
3	I can clearly explain to my group members the purpose of the assigned group work.	1	2	3	4	5
4	When doing group work, I can communicate with my group members to put effort into realizing and achieving a shared goal.	1	2	3	4	5
5	When doing group work, I regularly hold meetings with my group members to ensure they are aligned with the shared goal.	1	2	3	4	5
6	I try to do activities that widen my learning in areas considered strategic rather than accepting the learning opportunities as they arise.	1	2	3	4	5
7	I always do something with purpose.	1	2	3	4	5
8	I'm constantly scanning my surroundings for clues that something has to change in my learning.	1	2	3	4	5
9	I constantly analyze my strengths and weaknesses to improve my learning.	1	2	3	4	5
10	I compare my learning performance to my peers to improve my learning.	1	2	3	4	5
11	Despite embracing new initiatives, I initiate reasonable action when potentially negative consequences are expected.	1	2	3	4	5
12	Although I am typically bold in decision-making situations with uncertainty, I spend time analyzing a particular situation to avoid overthinking decisions.	1	2	3	4	5
13	Although I am a risk-taker, I identify any potential risks in every decision.	1	2	3	4	5
14	Although I like doing new projects, I anticipate the possibility of something bad that might happen in those projects.	1	2	3	4	5
15	I develop plans to minimize risks (unpleasant things possibly	1	2	3	4	5

No.	Statements	Strongly Disagree→Strongly Agree				
		1	2	3	4	5
	happening) when doing new projects.					
16	I constantly evaluate my current knowledge and skills.	1	2	3	4	5
17	I seek other knowledge or skills that can help achieve long-term goals.	1	2	3	4	5
18	I view mistakes and setbacks as learning opportunities.	1	2	3	4	5
19	I make time for developmental activities, such as taking classes and participating in workshops.	1	2	3	4	5
20	I believe that effort will make my learning better.	1	2	3	4	5
21	I constantly ask questions to broaden my knowledge and skills.	1	2	3	4	5
22	I am enthusiastic about learning.	1	2	3	4	5
23	I seek to understand others by listening deeply to what they want to accomplish, what problems they face, and how I might take on their problem when I engage in social service activities.	1	2	3	4	5
24	I treat others with courtesy and sensitivity.	1	2	3	4	5
25	I make an effort to address needs and concerns of others.	1	2	3	4	5
26	I am passionately alert to the possibility of transforming my future goals into reality.	1	2	3	4	5
27	I am constantly looking for new opportunities to improve my learning.	1	2	3	4	5
28	I pay attention to issues that are no part of my daily work and wonder how things can be improved.	1	2	3	4	5
29	I ask valued peers to help undertake opportunities.	1	2	3	4	5
30	I often see barriers as opportunities.	1	2	3	4	5
31	I move beyond habitual thinking blocks (e.g., habitual thinking blocks include “It’s always been done that way” or “we already tried that”).	1	2	3	4	5
32	I always think that “there’s got to be a better way” in mind.	1	2	3	4	5
33	If I personally have different ideas from the teacher, school management team, or other seniors, I find ways to communicate that without damaging the relationships.	1	2	3	4	5
34	I like asking what-if and why/why-not questions (e.g., “Why don’t they do it this other way?” or “What if we try a different approach to solving this problem?”)	1	2	3	4	5
35	I am open to new ideas even though those ideas are opposed to existing practices.	1	2	3	4	5
36	I position myself to turn the surrounding trends into new opportunities by analyzing and understanding developments.	1	2	3	4	5
37	I propose the initiative to do something new.	1	2	3	4	5
38	I have always been an agent for positive change, no matter where I have been.	1	2	3	4	5
39	When I see something awkward, I fix it.	1	2	3	4	5
40	I anticipate causes and consequences of uncertain events for good opportunities.	1	2	3	4	5
41	I am constantly looking for new ways to improve my life.	1	2	3	4	5
42	I intentionally generate ideas by brainstorming and mind-mapping when doing group work or in meetings.	1	2	3	4	5
43	I encourage peers to the idea generation process.	1	2	3	4	5

No.	Statements	Strongly Disagree→Strongly Agree				
		1	2	3	4	5
44	I engage in activities more usually associated with leadership or entrepreneurship.	1	2	3	4	5
45	I hold two opposing ideas in the mind at the same time and open to a third solution when discussing on a problem.	1	2	3	4	5
46	I prefer to try new ways of solving a problem rather than accepted ways.	1	2	3	4	5
47	I often fantasize about impossible things.	1	2	3	4	5
48	I attempt to convince other people to support my innovative ideas through contacts.	1	2	3	4	5
49	I make my peers enthusiastic for innovative ideas.	1	2	3	4	5
50	I engage in promotional activities to gather both social (such as networks with peers or organizations) and financial resources for making my novel idea happen.	1	2	3	4	5
51	I set a meeting with my peers to outline the value of change or improvements in the school on an ongoing basis.	1	2	3	4	5
52	I engage in networking opportunities that appeal to my peers.	1	2	3	4	5
53	I systematically introduce innovative ideas into practices.	1	2	3	4	5
54	I contribute to the implementation of new ideas.	1	2	3	4	5
55	I put effort in the development of new things.	1	2	3	4	5
56	I prepare to deal with other people's reactions when facing a tough decision.	1	2	3	4	5
57	I look for an opportunity to share feelings and opinions with clarity and conviction, despite any resistance that happens to occur.	1	2	3	4	5
58	I am assertive rather than being aggressive.	1	2	3	4	5
59	When doing group work or engaging in social-service activities, I show commitment to the implementation of new ideas through various behaviors and actions.	1	2	3	4	5
60	If I am a team leader, I take blames on behalf of my team members in implementing any new idea or project.	1	2	3	4	5
61	When I want surrounding people to follow my new idea, I do it first as an example.	1	2	3	4	5
62	I show confidence in my team members' contributions to implement new ideas when doing a group work.	1	2	3	4	5
63	I embrace failure as a natural part of the implementation of new ideas.	1	2	3	4	5
64	I encourage peers to stick to their ideas.	1	2	3	4	5
65	I find a way to help peers overcome the challenges they face.	1	2	3	4	5
66	I support and motivate peers to participate in social service activities to make change.	1	2	3	4	5
67	I praise my group members for expressing new and good ideas when doing group work.	1	2	3	4	5
68	I provide group members with opportunities to implement their new ideas.	1	2	3	4	5
69	I believe that a leader should reward rather than punish innovative attempts by group members.	1	2	3	4	5

Section 3: Open-Ended Questions

Please look back at one critical incident in which you were involved to make change or improvement as well as creating something new in your school or community or finding new ways to solve a problem in group work with your peers. Please provide a detailed description of:

What event was it?

.....

.....

Where did the incident occur?

.....

Who were involved

.....

What happened?

.....

.....

.....

.....

What did you do and say as a participant in the incident?

.....

.....

What was the outcome or result of this incident?

.....

.....

What did you learn from this incident?

.....

.....

What skills are needed to perform effectively in the incident like this?

.....

.....

Questionnaire on Current and Desirable States of Academic Management Based on the Concept of Innovation Leadership Skills



Questionnaire

“Current and Desirable States of Academic Management Strategies of Secondary Schools in Cambodia based on the Concept of Innovation Leadership Skills”

Instruction:

1. This questionnaire is conducted to answer the third research objective of the above-mentioned dissertation title that is *“to analyze strengths, weaknesses, opportunities, and threats of academic management based on the concept of innovation leadership skills.”*

2. The questionnaire consists of four sections as follows:

Section 1: Personal data of the respondents

Section 2: Current and Desirable States of Academic Management based on the Concept of Innovation Leadership Skills

Section 3: External Environment of Academic Management based on the Concept of Innovation Leadership Skills

Section 4: Open-ended questions

3. You may need to read definitions of terms before and during answering questions to clearly understand specific key terms in the questions.

4. The questionnaire will take about 40 minutes. Your participation is voluntary. Your returned questionnaire will be considered your participation in this study.

5. Please remember all your responses will be kept confidential, private, and anonymous and the results will be interpreted as a whole, not individually. The data will be deleted in one year after complete graduation.

6. Thank you for taking the time to fill out this questionnaire.

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Definitions of Terms

Innovation leadership skills: skills of an individual uses by herself/himself or influence others to make change or innovation, consisting of realizing innovation vision, strategic thinking, managing risk, demonstrating curiosity, developing empathy for others, opportunity exploration, assaulting assumptions, idea generation, idea championing, idea application, proactive thinking, leading courageously, leading by example, promoting a culture of trust, and recognizing innovators.

Realizing innovation vision: the ability to define and convey the innovation strategy to members, as well as build it into reality.

Strategic thinking: the ability to perform the environmental analysis and seek learning opportunities in areas considered strategic, as well as bring a strategic perspective to the innovation process.

Managing risk: the ability to identify blind spots missed previously and formulate plans to avert the risk.

Demonstrating curiosity: the ability to keep knowledge and skills current and actively take the initiative to learn new information, demonstrating engagement and loyalty to goals.

Developing Empathy for others: the ability to understand the end user's problems and what they want to accomplish.

Opportunity exploration: the ability to identify new opportunities and/or a problem needed to be solved.

Assaulting assumptions: the ability to move beyond habitual thinking blocks and continuously challenge the status quo and personal, professional, and industry assumptions.

Proactive thinking: the ability to illuminate emerging trends and turn them into new opportunities by understanding and analyzing the developments applied to their own environment.

Idea generation: the ability to use own novel thinking capabilities and support members to generate ideas on innovation through various techniques.

Idea championing: the ability to sell a new idea through personal commitment, persuasive communication, as well as potential alliances.

Idea application: the ability to bring the new supported idea into practice and make innovation a regular part of daily operation.

Leading courageously: the ability to lead with confidence and authority, accept responsibility for making challenging decisions, engage and maintain audience attention in high-stakes meetings and discussions, as well as do not avoid conflicts and differences of opinion.

Leading by example: the ability to act as a role model and unconventionally related to innovation that causes members to engage in such behaviors.

Promoting a culture of trust: the ability to believe in members and embrace failure on innovation, as well as eliminate challenges to innovation creation faced by members.

Recognizing the innovators: the ability to use a reward system for contributing to innovation.

Section 1: Personal Data of the Respondents

Instruction: Please tick (✓) in the box that is true for you or fill in the spaces provided.

1. Gender: Male Female
2. Age (years old): less than 30 31-40 41-50 greater than 50
3. Highest Education Level:
 - Associate Bachelor Master Doctoral
 - Others (please specify):.....
4. Work experience in the current position (years):
 - less than/equal to 5 6-10 11-15 16-20 greater than 20
5. Current Position: Director Vice Director Teacher

For Director/Vice Director:

6. What is the total number of classes in the school?
 - less than/equal to 20 21-40 greater than 41

For teacher:

7. What subject do you teach? Answer:
8. What grade do you teach?
 - 7th 8th 9th 10th 11th 12th
9. In what education strand is your class in? (for grade 10, 11, and 12; for grade 7, 8, and 9 please skip this question)
 - Science Social Science

Section 2: Current and Desirable States of Academic Management based on the Concept of Innovation Leadership Skills

Instruction: Please read the following questions and tick (✓) on number 1, 2, 3, 4, or 5 in the **current state** column as follows:

- 5 refers to you see your school currently practices that point at the highest level
- 4 refers to you see your school currently practices that point at the high level
- 3 refers to you see your school currently practices that point at the medium level
- 2 refers to you see your school currently practices that point at the low level
- 1 refers to you see your school currently practices that point at the lowest level

And tick (✓) on number 1, 2, 3, 4, or 5 in the **desirable state** column as follows:

- 5 refers to you think your school should practice that point at the highest level
- 4 refers to you think your school should practice that point at the high level
- 3 refers to you think your school should practice that point at the medium level
- 2 refers to you think your school should practice that point at the low level
- 1 refers to you think your school should practice that point at the lowest level

Example:

Academic Management based on the Concept of Innovation Leadership Skills	Current State Lowest → Highest					Desirable State Lowest → Highest				
	1	2	3	4	5	1	2	3	4	5
	1. At what level does your school <i>identify learning outcomes</i> in the curriculum related to students' innovation leadership skills as follows?									
1.1 Realizing innovation vision	1	2	√	4	5	1	2	3	4	√
1.2 Strategic thinking	1	2	3	√	5	1	2	3	4	√

Interpretation (Question 1.1): You see your school currently *identify learning outcomes* in the **curriculum** related to students' innovation leadership skills in terms of **realizing innovation vision** at the medium level, and you think your school should *identify learning outcomes* in the **curriculum** related to students' innovation leadership skills in terms of **realizing innovation vision** at the highest level.

Academic Management based on the Concept of Innovation Leadership Skills	Current State Lowest → Highest					Desirable State Lowest → Highest				
	1	2	3	4	5	1	2	3	4	5
	1. At what level does your school <i>identify learning outcomes</i> in the curriculum related to students' innovation leadership skills as follows?									
1.1 Realizing innovation vision		2	3	4	5	1	2	3	4	5
1.2 Strategic thinking		2	3	4	5	1	2	3	4	5
1.3 Managing risk		2	3	4	5	1	2	3	4	5
1.4 Demonstrating curiosity		2	3	4	5	1	2	3	4	5
1.5 Developing Empathy for others		2	3	4	5	1	2	3	4	5
1.6 Opportunity exploration		2	3	4	5	1	2	3	4	5
1.7 Assaulting assumptions		2	3	4	5	1	2	3	4	5
1.8 Proactive thinking		2	3	4	5	1	2	3	4	5
1.9 Idea generation		2	3	4	5	1	2	3	4	5
1.10 Idea championing		2	3	4	5	1	2	3	4	5
1.11 Idea application		2	3	4	5	1	2	3	4	5
1.12 Leading courageously		2	3	4	5	1	2	3	4	5
1.13 Leading by example		2	3	4	5	1	2	3	4	5
1.14 Promoting a culture of trust		2	3	4	5	1	2	3	4	5
1.15 Recognizing the innovators		2	3	4	5	1	2	3	4	5
2. At what level does your school <i>use learning outcomes</i> in course development to develop students' innovation leadership skills as follows?										
2.1 Realizing innovation vision		2	3	4	5	1	2	3	4	5
2.2 Strategic thinking		2	3	4	5	1	2	3	4	5
2.3 Managing risk		2	3	4	5	1	2	3	4	5
2.4 Demonstrating curiosity		2	3	4	5	1	2	3	4	5
2.5 Developing Empathy for others		2	3	4	5	1	2	3	4	5
2.6 Opportunity exploration		2	3	4	5	1	2	3	4	5
2.7 Assaulting assumptions		2	3	4	5	1	2	3	4	5
2.8 Proactive thinking		2	3	4	5	1	2	3	4	5
2.9 Idea generation		2	3	4	5	1	2	3	4	5
2.10 Idea championing		2	3	4	5	1	2	3	4	5

Academic Management based on the Concept of Innovation Leadership Skills	Current State					Desirable State				
	Lowest → Highest					Lowest → Highest				
	1	2	3	4	5	1	2	3	4	5
2.11 Idea application	1	2	3	4	5	1	2	3	4	5
2.12 Leading courageously	1	2	3	4	5	1	2	3	4	5
2.13 Leading by example	1	2	3	4	5	1	2	3	4	5
2.14 Promoting a culture of trust	1	2	3	4	5	1	2	3	4	5
2.15 Recognizing the innovators	1	2	3	4	5	1	2	3	4	5
3. At what level does your school <i>use learning media and resources</i> in teaching and learning to develop students' innovation leadership skills as follows?										
3.1 Realizing innovation vision	1	2	3	4	5	1	2	3	4	5
3.2 Strategic thinking	1	2	3	4	5	1	2	3	4	5
3.3 Managing risk	1	2	3	4	5	1	2	3	4	5
3.4 Demonstrating curiosity	1	2	3	4	5	1	2	3	4	5
3.5 Developing Empathy for others	1	2	3	4	5	1	2	3	4	5
3.6 Opportunity exploration	1	2	3	4	5	1	2	3	4	5
3.7 Assaulting assumptions	1	2	3	4	5	1	2	3	4	5
3.8 Proactive thinking	1	2	3	4	5	1	2	3	4	5
3.9 Idea generation	1	2	3	4	5	1	2	3	4	5
3.10 Idea championing	1	2	3	4	5	1	2	3	4	5
3.11 Idea application	1	2	3	4	5	1	2	3	4	5
3.12 Leading courageously	1	2	3	4	5	1	2	3	4	5
3.13 Leading by example	1	2	3	4	5	1	2	3	4	5
3.14 Promoting a culture of trust	1	2	3	4	5	1	2	3	4	5
3.15 Recognizing the innovators	1	2	3	4	5	1	2	3	4	5
4. At what level does your school <i>organize learning activities</i> to develop students' innovation leadership skills as follows?										
4.1 Realizing innovation vision	1	2	3	4	5	1	2	3	4	5
4.2 Strategic thinking	1	2	3	4	5	1	2	3	4	5
4.3 Managing risk	1	2	3	4	5	1	2	3	4	5
4.4 Demonstrating curiosity	1	2	3	4	5	1	2	3	4	5
4.5 Developing Empathy for others	1	2	3	4	5	1	2	3	4	5
4.6 Opportunity exploration	1	2	3	4	5	1	2	3	4	5
4.7 Assaulting assumptions	1	2	3	4	5	1	2	3	4	5
4.8 Proactive thinking	1	2	3	4	5	1	2	3	4	5
4.9 Idea generation	1	2	3	4	5	1	2	3	4	5
4.10 Idea championing	1	2	3	4	5	1	2	3	4	5
4.11 Idea application	1	2	3	4	5	1	2	3	4	5
4.12 Leading courageously	1	2	3	4	5	1	2	3	4	5
4.13 Leading by example	1	2	3	4	5	1	2	3	4	5
4.14 Promoting a culture of trust	1	2	3	4	5	1	2	3	4	5
4.15 Recognizing the innovators	1	2	3	4	5	1	2	3	4	5
5. At what level does your school <i>measure and evaluate students' learning outcomes</i> related to students' innovation leadership skills as follows?										

Academic Management based on the Concept of Innovation Leadership Skills	Current State					Desirable State				
	Lowest → Highest					Lowest → Highest				
	1	2	3	4	5	1	2	3	4	5
5.1 Realizing innovation vision	1	2	3	4	5	1	2	3	4	5
5.2 Strategic thinking	1	2	3	4	5	1	2	3	4	5
5.3 Managing risk	1	2	3	4	5	1	2	3	4	5
5.4 Demonstrating curiosity	1	2	3	4	5	1	2	3	4	5
5.5 Developing Empathy for others	1	2	3	4	5	1	2	3	4	5
5.6 Opportunity exploration	1	2	3	4	5	1	2	3	4	5
5.7 Assaulting assumptions	1	2	3	4	5	1	2	3	4	5
5.8 Proactive thinking	1	2	3	4	5	1	2	3	4	5
5.9 Idea generation	1	2	3	4	5	1	2	3	4	5
5.10 Idea championing	1	2	3	4	5	1	2	3	4	5
5.11 Idea application	1	2	3	4	5	1	2	3	4	5
5.12 Leading courageously	1	2	3	4	5	1	2	3	4	5
5.13 Leading by example	1	2	3	4	5	1	2	3	4	5
5.14 Promoting a culture of trust	1	2	3	4	5	1	2	3	4	5
5.15 Recognizing the innovators	1	2	3	4	5	1	2	3	4	5

Section 3: External Environment of Academic Management based on the Concept of Innovation Leadership Skills

Instruction: Please read the following questions and tick (✓) on number 1, 2, 3, 4, or 5 in the **current state** column as follows:

5 refers to you see those external factors help your school's current practices of that point at the highest level

4 refers to you see those external factors help your school's current practices of that point at the high level

3 refers to you see those external factors help to your school's current practices of that point at the medium level

2 refers to you see those external factors help your school's current practices of that point at the low level

1 refers to you see those external factors help your school's current practices of that point at the lowest level

And tick (✓) on number 1, 2, 3, 4, or 5 in the **desirable state** column as follows:

5 refers to you think those external factors should help your school practice that point at the highest level

4 refers to you think those external factors should help your school practice that point at the high level

3 refers to you think those external factors should help your school practice that point at the medium level

2 refers to you think those external factors should help your school practice that point at the low level

1 refers to you think those external factors should help your school practice that point at the lowest level

Academic Management based on the Concept of Innovation Leadership Skills	Current State					Desirable State				
	Lowest → Highest					Lowest → Highest				
	1	2	3	4	5	1	2	3	4	5
Political-Legal (P): such as political situations, government and ministry policies, educational decrees / sub-decrees / declaration										
1. At what level do <i>politics and legal factors</i> enable curriculum development to develop students' innovation leadership skills as follows?										
1.1 Realizing innovation vision	1	2	3	4	5	1	2	3	4	5
1.2 Strategic thinking	1	2	3	4	5	1	2	3	4	5
1.3 Managing risk	1	2	3	4	5	1	2	3	4	5
1.4 Demonstrating curiosity	1	2	3	4	5	1	2	3	4	5
1.5 Developing Empathy for others	1	2	3	4	5	1	2	3	4	5
1.6 Opportunity exploration	1	2	3	4	5	1	2	3	4	5
1.7 Assaulting assumptions	1	2	3	4	5	1	2	3	4	5
1.8 Proactive thinking	1	2	3	4	5	1	2	3	4	5
1.9 Idea generation	1	2	3	4	5	1	2	3	4	5
1.10 Idea championing	1	2	3	4	5	1	2	3	4	5
1.11 Idea application	1	2	3	4	5	1	2	3	4	5
1.12 Leading courageously	1	2	3	4	5	1	2	3	4	5
1.13 Leading by example	1	2	3	4	5	1	2	3	4	5
1.14 Promoting a culture of trust	1	2	3	4	5	1	2	3	4	5
1.15 Recognizing the innovators	1	2	3	4	5	1	2	3	4	5
2. At what level do <i>politics and legal factors</i> enable teaching and learning to develop students' innovation leadership skills as follows?										
2.1 Realizing innovation vision	1	2	3	4	5	1	2	3	4	5
2.2 Strategic thinking	1	2	3	4	5	1	2	3	4	5
2.3 Managing risk	1	2	3	4	5	1	2	3	4	5
2.4 Demonstrating curiosity	1	2	3	4	5	1	2	3	4	5
2.5 Developing Empathy for others	1	2	3	4	5	1	2	3	4	5
2.6 Opportunity exploration	1	2	3	4	5	1	2	3	4	5
2.7 Assaulting assumptions	1	2	3	4	5	1	2	3	4	5
2.8 Proactive thinking	1	2	3	4	5	1	2	3	4	5
2.9 Idea generation	1	2	3	4	5	1	2	3	4	5
2.10 Idea championing	1	2	3	4	5	1	2	3	4	5
2.11 Idea application	1	2	3	4	5	1	2	3	4	5
2.12 Leading courageously	1	2	3	4	5	1	2	3	4	5
2.13 Leading by example	1	2	3	4	5	1	2	3	4	5
2.14 Promoting a culture of trust	1	2	3	4	5	1	2	3	4	5
2.15 Recognizing the innovators	1	2	3	4	5	1	2	3	4	5
3. At what level do <i>politics and legal factors</i> enable measurement and evaluation on students' learning outcomes related to students' innovation leadership skills as follows?										
3.1 Realizing innovation vision	1	2	3	4	5	1	2	3	4	5
3.2 Strategic thinking	1	2	3	4	5	1	2	3	4	5
3.3 Managing risk	1	2	3	4	5	1	2	3	4	5
3.4 Demonstrating curiosity	1	2	3	4	5	1	2	3	4	5
3.5 Developing Empathy for others	1	2	3	4	5	1	2	3	4	5
3.6 Opportunity exploration	1	2	3	4	5	1	2	3	4	5

Academic Management based on the Concept of Innovation Leadership Skills	Current State					Desirable State				
	Lowest → Highest					Lowest → Highest				
	1	2	3	4	5	1	2	3	4	5
3.7 Assaulting assumptions	1	2	3	4	5	1	2	3	4	5
3.8 Proactive thinking	1	2	3	4	5	1	2	3	4	5
3.9 Idea generation	1	2	3	4	5	1	2	3	4	5
3.10 Idea championing	1	2	3	4	5	1	2	3	4	5
3.11 Idea application	1	2	3	4	5	1	2	3	4	5
3.12 Leading courageously	1	2	3	4	5	1	2	3	4	5
3.13 Leading by example	1	2	3	4	5	1	2	3	4	5
3.14 Promoting a culture of trust	1	2	3	4	5	1	2	3	4	5
3.15 Recognizing the innovators	1	2	3	4	5	1	2	3	4	5
Economic Factors (E): such as economic situations, national budget, investment, and employment										
4. At what level do <i>economic factors</i> enable curriculum development to develop students' innovation leadership skills as follows?										
4.1 Realizing innovation vision	1	2	3	4	5	1	2	3	4	5
4.2 Strategic thinking	1	2	3	4	5	1	2	3	4	5
4.3 Managing risk	1	2	3	4	5	1	2	3	4	5
4.4 Demonstrating curiosity	1	2	3	4	5	1	2	3	4	5
4.5 Developing Empathy for others	1	2	3	4	5	1	2	3	4	5
4.6 Opportunity exploration	1	2	3	4	5	1	2	3	4	5
4.7 Assaulting assumptions	1	2	3	4	5	1	2	3	4	5
4.8 Proactive thinking	1	2	3	4	5	1	2	3	4	5
4.9 Idea generation	1	2	3	4	5	1	2	3	4	5
4.10 Idea championing	1	2	3	4	5	1	2	3	4	5
4.11 Idea application	1	2	3	4	5	1	2	3	4	5
4.12 Leading courageously	1	2	3	4	5	1	2	3	4	5
4.13 Leading by example	1	2	3	4	5	1	2	3	4	5
4.14 Promoting a culture of trust	1	2	3	4	5	1	2	3	4	5
4.15 Recognizing the innovators	1	2	3	4	5	1	2	3	4	5
5. At what level do <i>economic factors</i> enable teaching and learning to develop students' innovation leadership skills as follows?										
5.1 Realizing innovation vision	1	2	3	4	5	1	2	3	4	5
5.2 Strategic thinking	1	2	3	4	5	1	2	3	4	5
5.3 Managing risk	1	2	3	4	5	1	2	3	4	5
5.4 Demonstrating curiosity	1	2	3	4	5	1	2	3	4	5
5.5 Developing Empathy for others	1	2	3	4	5	1	2	3	4	5
5.6 Opportunity exploration	1	2	3	4	5	1	2	3	4	5
5.7 Assaulting assumptions	1	2	3	4	5	1	2	3	4	5
5.8 Proactive thinking	1	2	3	4	5	1	2	3	4	5
5.9 Idea generation	1	2	3	4	5	1	2	3	4	5
5.10 Idea championing	1	2	3	4	5	1	2	3	4	5
5.11 Idea application	1	2	3	4	5	1	2	3	4	5
5.12 Leading courageously	1	2	3	4	5	1	2	3	4	5
5.13 Leading by example	1	2	3	4	5	1	2	3	4	5
5.14 Promoting a culture of trust	1	2	3	4	5	1	2	3	4	5
5.15 Recognizing the innovators	1	2	3	4	5	1	2	3	4	5
6. At what level do <i>economic factors</i> enable measurement and evaluation on students' learning										

Academic Management based on the Concept of Innovation Leadership Skills	Current State					Desirable State				
	Lowest → Highest					Lowest → Highest				
	1	2	3	4	5	1	2	3	4	5
outcomes related to students' innovation leadership skills as follows?										
6.1 Realizing innovation vision	1	2	3	4	5	1	2	3	4	5
6.2 Strategic thinking	1	2	3	4	5	1	2	3	4	5
6.3 Managing risk	1	2	3	4	5	1	2	3	4	5
6.4 Demonstrating curiosity	1	2	3	4	5	1	2	3	4	5
6.5 Developing Empathy for others	1	2	3	4	5	1	2	3	4	5
6.6 Opportunity exploration	1	2	3	4	5	1	2	3	4	5
6.7 Assaulting assumptions	1	2	3	4	5	1	2	3	4	5
6.8 Proactive thinking	1	2	3	4	5	1	2	3	4	5
6.9 Idea generation	1	2	3	4	5	1	2	3	4	5
6.10 Idea championing	1	2	3	4	5	1	2	3	4	5
6.11 Idea application	1	2	3	4	5	1	2	3	4	5
6.12 Leading courageously	1	2	3	4	5	1	2	3	4	5
6.13 Leading by example	1	2	3	4	5	1	2	3	4	5
6.14 Promoting a culture of trust	1	2	3	4	5	1	2	3	4	5
6.15 Recognizing the innovators	1	2	3	4	5	1	2	3	4	5
Socio-Cultural Factors (S): such as educational system, family and community background, ethnic and religion, values, beliefs, and social organizations										
7. At what level do <i>socio-cultural factors</i> enable curriculum development to develop students' innovation leadership skills as follows?										
7.1 Realizing innovation vision	1	2	3	4	5	1	2	3	4	5
7.2 Strategic thinking	1	2	3	4	5	1	2	3	4	5
7.3 Managing risk	1	2	3	4	5	1	2	3	4	5
7.4 Demonstrating curiosity	1	2	3	4	5	1	2	3	4	5
7.5 Developing Empathy for others	1	2	3	4	5	1	2	3	4	5
7.6 Opportunity exploration	1	2	3	4	5	1	2	3	4	5
7.7 Assaulting assumptions	1	2	3	4	5	1	2	3	4	5
7.8 Proactive thinking	1	2	3	4	5	1	2	3	4	5
7.9 Idea generation	1	2	3	4	5	1	2	3	4	5
7.10 Idea championing	1	2	3	4	5	1	2	3	4	5
7.11 Idea application	1	2	3	4	5	1	2	3	4	5
7.12 Leading courageously	1	2	3	4	5	1	2	3	4	5
7.13 Leading by example	1	2	3	4	5	1	2	3	4	5
7.14 Promoting a culture of trust	1	2	3	4	5	1	2	3	4	5
7.15 Recognizing the innovators	1	2	3	4	5	1	2	3	4	5
8. At what level do <i>socio-cultural factors</i> enable teaching and learning to develop students' innovation leadership skills as follows?										
8.1 Realizing innovation vision	1	2	3	4	5	1	2	3	4	5
8.2 Strategic thinking	1	2	3	4	5	1	2	3	4	5
8.3 Managing risk	1	2	3	4	5	1	2	3	4	5
8.4 Demonstrating curiosity	1	2	3	4	5	1	2	3	4	5
8.5 Developing Empathy for others	1	2	3	4	5	1	2	3	4	5
8.6 Opportunity exploration	1	2	3	4	5	1	2	3	4	5
8.7 Assaulting assumptions	1	2	3	4	5	1	2	3	4	5
8.8 Proactive thinking	1	2	3	4	5	1	2	3	4	5

Academic Management based on the Concept of Innovation Leadership Skills	Current State					Desirable State				
	Lowest → Highest					Lowest → Highest				
	1	2	3	4	5	1	2	3	4	5
8.9 Idea generation	1	2	3	4	5	1	2	3	4	5
8.10 Idea championing	1	2	3	4	5	1	2	3	4	5
8.11 Idea application	1	2	3	4	5	1	2	3	4	5
8.12 Leading courageously	1	2	3	4	5	1	2	3	4	5
8.13 Leading by example	1	2	3	4	5	1	2	3	4	5
8.14 Promoting a culture of trust	1	2	3	4	5	1	2	3	4	5
8.15 Recognizing the innovators	1	2	3	4	5	1	2	3	4	5
9. At what level do <i>socio-cultural factors</i> enable measurement and evaluation on students' learning outcomes related to students' innovation leadership skills as follows?										
9.1 Realizing innovation vision	1	2	3	4	5	1	2	3	4	5
9.2 Strategic thinking	1	2	3	4	5	1	2	3	4	5
9.3 Managing risk	1	2	3	4	5	1	2	3	4	5
9.4 Demonstrating curiosity	1	2	3	4	5	1	2	3	4	5
9.5 Developing Empathy for others	1	2	3	4	5	1	2	3	4	5
9.6 Opportunity exploration	1	2	3	4	5	1	2	3	4	5
9.7 Assaulting assumptions	1	2	3	4	5	1	2	3	4	5
9.8 Proactive thinking	1	2	3	4	5	1	2	3	4	5
9.9 Idea generation	1	2	3	4	5	1	2	3	4	5
9.10 Idea championing	1	2	3	4	5	1	2	3	4	5
9.11 Idea application	1	2	3	4	5	1	2	3	4	5
9.12 Leading courageously	1	2	3	4	5	1	2	3	4	5
9.13 Leading by example	1	2	3	4	5	1	2	3	4	5
9.14 Promoting a culture of trust	1	2	3	4	5	1	2	3	4	5
9.15 Recognizing the innovators	1	2	3	4	5	1	2	3	4	5
Technological Factors (T): such as technological advancement and innovations, internet, automation, and online learning tools										
10. At what level do <i>technological factors</i> enable curriculum development to develop students' innovation leadership skills as follows?										
10.1 Realizing innovation vision	1	2	3	4	5	1	2	3	4	5
10.2 Strategic thinking	1	2	3	4	5	1	2	3	4	5
10.3 Managing risk	1	2	3	4	5	1	2	3	4	5
10.4 Demonstrating curiosity	1	2	3	4	5	1	2	3	4	5
10.5 Developing Empathy for others	1	2	3	4	5	1	2	3	4	5
10.6 Opportunity exploration	1	2	3	4	5	1	2	3	4	5
10.7 Assaulting assumptions	1	2	3	4	5	1	2	3	4	5
10.8 Proactive thinking	1	2	3	4	5	1	2	3	4	5
10.9 Idea generation	1	2	3	4	5	1	2	3	4	5
10.10 Idea championing	1	2	3	4	5	1	2	3	4	5
10.11 Idea application	1	2	3	4	5	1	2	3	4	5
10.12 Leading courageously	1	2	3	4	5	1	2	3	4	5
10.13 Leading by example	1	2	3	4	5	1	2	3	4	5
10.14 Promoting a culture of trust	1	2	3	4	5	1	2	3	4	5
10.15 Recognizing the innovators	1	2	3	4	5	1	2	3	4	5
11. At what level do <i>technological factors</i> enable teaching and learning to develop students' innovation leadership skills as follows?										

Academic Management based on the Concept of Innovation Leadership Skills	Current State					Desirable State				
	Lowest → Highest					Lowest → Highest				
	1	2	3	4	5	1	2	3	4	5
11.1 Realizing innovation vision	1	2	3	4	5	1	2	3	4	5
11.2 Strategic thinking	1	2	3	4	5	1	2	3	4	5
11.3 Managing risk	1	2	3	4	5	1	2	3	4	5
11.4 Demonstrating curiosity	1	2	3	4	5	1	2	3	4	5
11.5 Developing Empathy for others	1	2	3	4	5	1	2	3	4	5
11.6 Opportunity exploration	1	2	3	4	5	1	2	3	4	5
11.7 Assaulting assumptions	1	2	3	4	5	1	2	3	4	5
11.8 Proactive thinking	1	2	3	4	5	1	2	3	4	5
11.9 Idea generation	1	2	3	4	5	1	2	3	4	5
11.10 Idea championing	1	2	3	4	5	1	2	3	4	5
11.11 Idea application	1	2	3	4	5	1	2	3	4	5
11.12 Leading courageously	1	2	3	4	5	1	2	3	4	5
11.13 Leading by example	1	2	3	4	5	1	2	3	4	5
11.14 Promoting a culture of trust	1	2	3	4	5	1	2	3	4	5
11.15 Recognizing the innovators	1	2	3	4	5	1	2	3	4	5
12. At what level do <i>technological factors</i> enable measurement and evaluation on students' learning outcomes related to students' innovation leadership skills as follows?										
12.1 Realizing innovation vision	1	2	3	4	5	1	2	3	4	5
12.2 Strategic thinking	1	2	3	4	5	1	2	3	4	5
12.3 Managing risk	1	2	3	4	5	1	2	3	4	5
12.4 Demonstrating curiosity	1	2	3	4	5	1	2	3	4	5
12.5 Developing Empathy for others	1	2	3	4	5	1	2	3	4	5
12.6 Opportunity exploration	1	2	3	4	5	1	2	3	4	5
12.7 Assaulting assumptions	1	2	3	4	5	1	2	3	4	5
12.8 Proactive thinking	1	2	3	4	5	1	2	3	4	5
12.9 Idea generation	1	2	3	4	5	1	2	3	4	5
12.10 Idea championing	1	2	3	4	5	1	2	3	4	5
12.11 Idea application	1	2	3	4	5	1	2	3	4	5
12.12 Leading courageously	1	2	3	4	5	1	2	3	4	5
12.13 Leading by example	1	2	3	4	5	1	2	3	4	5
12.14 Promoting a culture of trust	1	2	3	4	5	1	2	3	4	5
12.15 Recognizing the innovators	1	2	3	4	5	1	2	3	4	5

Section 4: Open-Ended Questions

1. Regarding **curriculum development**, who do you think are involved and what can be done to develop secondary school students' innovation leadership skills (such as Realizing innovation vision, Strategic thinking, etc.) mentioned above?

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2. Regarding **teaching and learning**, who do you think are involved and what can be done to develop secondary school students' innovation leadership skills (such as Realizing innovation vision, Strategic thinking, etc.) mentioned above?

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3. Regarding **measurement and evaluation**, who do you think are involved and what can be done to develop secondary school students' innovation leadership skills (such as Realizing innovation vision, Strategic thinking, etc.) mentioned above?

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Thank you for your participation.



Evaluation Form

“Suitability and Feasibility of the Strategies (First Draft)”

Instruction:

1. This evaluation form is part of the doctoral program in Educational Management and is conducted to answer the first research objective of the above-mentioned dissertation title that is *“to develop academic management strategies of secondary schools based on the Concept of innovation leadership skills.”*

2. The evaluation form consists of two sections as follows:

Section 1: Demographic information of the evaluator

Section 2: Strategies and substrategies of secondary schools’ academic management based on the concept of innovation leadership skills

Section 3: Procedures of the substrategies of secondary schools’ academic management based on the concept of innovation leadership skills

3. You may read Appendix for assisting your evaluation (Appendix is about data used for developing strategies and the draft of the strategies in detail).

4. The information obtained from this evaluation form will be analyzed and then used to develop the second draft of the strategies in the next phase.

5. Thank you very much for taking the time to participate in this evaluation.

Mr. Nguon Siek

Doctoral Candidate, Educational Management
Faculty of Education, Chulalongkorn University

Contact:

Email: siek_nguon@yahoo.com

Operational Definitions of Terms

Innovation leadership skills: skills of an individual uses by herself/himself or influence others to make change or innovation, consisting of realizing innovation vision, strategic thinking, managing risk, demonstrating curiosity, developing empathy for others, opportunity exploration, assaulting assumptions, idea generation, idea championing, idea application, proactive thinking, leading courageously, leading by example, promoting a culture of trust, and recognizing innovators.

Realizing innovation vision: the ability to define and convey the innovation strategy to members, as well as build it into reality.

Strategic thinking: the ability to perform the environmental analysis and seek learning opportunities in areas considered strategic, as well as bring a strategic perspective to the innovation process.

Managing risk: the ability to identify blind spots missed previously and formulate plans to avert the risk.

Demonstrating curiosity: the ability to keep knowledge and skills current and actively take the initiative to learn new information, demonstrating engagement and loyalty to goals.

Developing Empathy for others: the ability to understand the end user's problems and what they want to accomplish.

Opportunity exploration: the ability to identify new opportunities and/or a problem needed to be solved.

Assaulting assumptions: the ability to move beyond habitual thinking blocks and continuously challenge the status quo and personal, professional, and industry assumptions.

Proactive thinking: the ability to illuminate emerging trends and turn them into new opportunities by understanding and analyzing the developments applied to their own environment.

Idea generation: the ability to use own novel thinking capabilities and support members to generate ideas on innovation through various techniques.

Idea championing: the ability to sell a new idea through personal commitment, persuasive communication, as well as potential alliances.

Idea application: the ability to bring the new supported idea into practice and make innovation a regular part of daily operation.

Leading courageously: the ability to lead with confidence and authority, accept responsibility for making challenging decisions, engage and maintain audience attention in high-stakes meetings and discussions, as well as do not avoid conflicts and differences of opinion.

Leading by example: the ability to act as a role model and unconventionally related to innovation that causes members to engage in such behaviors.

Promoting a culture of trust: the ability to believe in members and embrace failure on innovation, as well as eliminate challenges to innovation creation faced by members.

Recognizing the innovators: the ability to use a reward system for contributing to innovation.

Academic management: curriculum development, teaching and learning, and measurement and evaluation to develop students' innovation leadership skills.

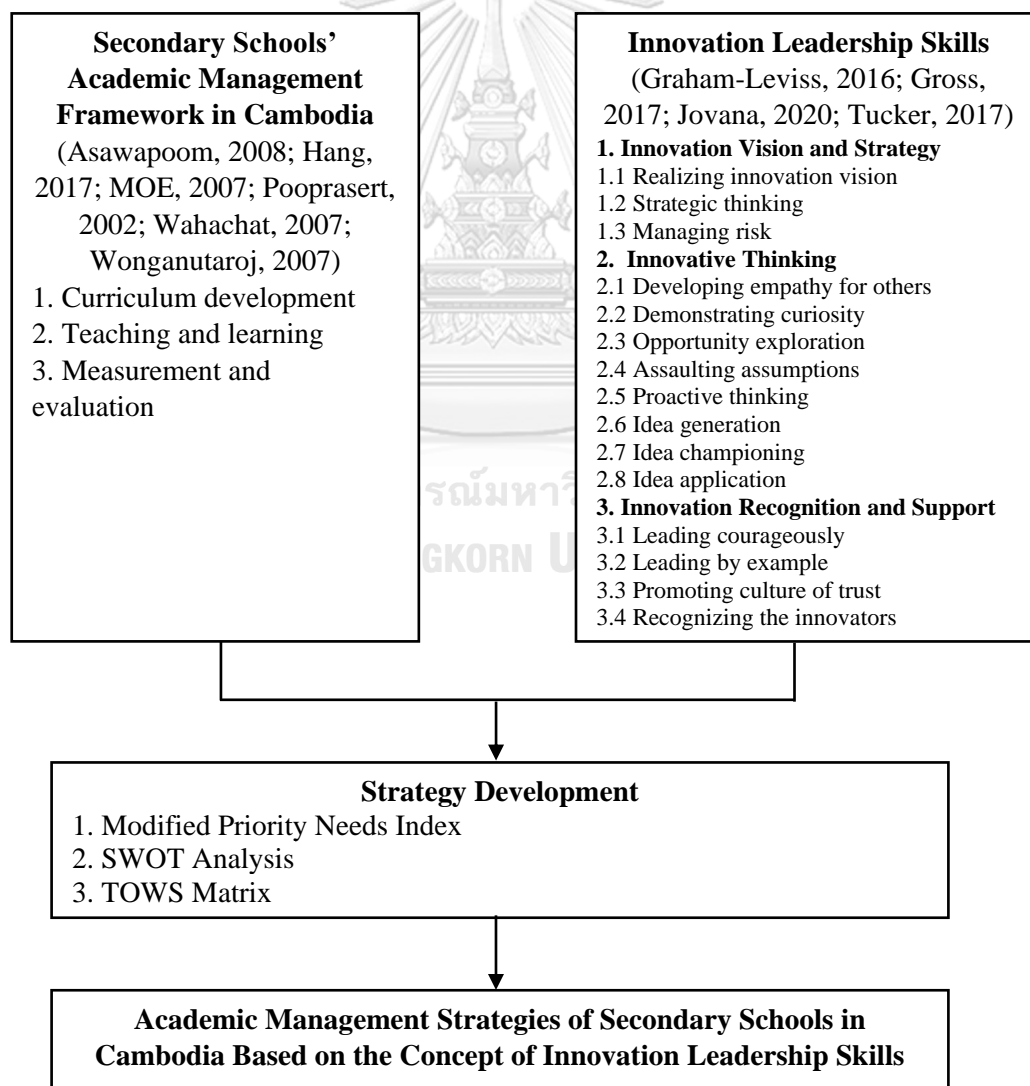
Curriculum development: Identifying learning outcomes in the curriculum and using learning outcomes in course development to develop the students' innovation leadership skills.

Teaching and learning: Using learning media and resources and organizing learning activities to develop the students' innovation leadership skills.

Measurement and evaluation: Setting evaluation criteria and constructing measuring tools and assessing learning outcomes to develop the students' innovation leadership skills.

Academic management strategies: proactive approaches to academic management based on strengths, weaknesses, opportunities, and threats (SWOT).

Conceptual Framework of the Study



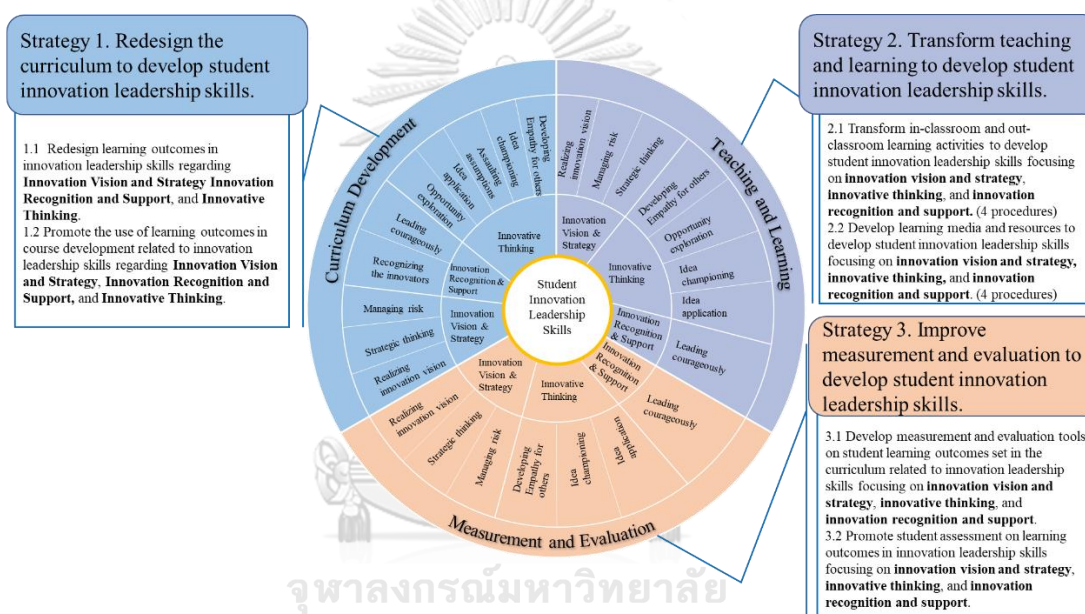
Strategy Development Principles

1) Strategies are developed based on the conceptual framework of academic management of secondary schools, consisting of curriculum development, teaching and learning, and measurement and evaluation.

2) Substrategies are developed based on the strategies and values of the PNI_{modified} of components and subcomponents of innovation leadership skills that are weaknesses, which need to be developed first, and top three lowest mean scores of students' innovation leadership skills levels.

3) Procedures are developed based on the results of the internal environment and the external environment analysis and the content analysis of open-ended question answers in the questionnaire and relevant literature.

Academic Management Strategies of Secondary Schools in Cambodia Based on the Concept of Innovation Leadership Skills (in overall aspect)



Section 1: Demographic Information of the Interviewee

Name-Surname:

Education Level: Major:

Current position:

Workplace:

Work experience in the current position (years)

Tel:

Email:

Section 2: Key strategies and strategies of secondary schools' academic management based on the concept of innovation leadership skills

Instruction: Please tick (✓) in the column number 1, 2, 3, 4, or 5 with the criteria as follows:

Suitability

- 5 refers to the strategy/substrategy/procedure is suitable at the **highest** level
- 4 refers to the strategy/substrategy/procedure is suitable at the **high** level
- 3 refers to the strategy/substrategy/procedure is suitable at the **moderate** level
- 2 refers to the strategy/substrategy/procedure is suitable at the **low** level
- 1 refers to the strategy/substrategy/procedure is suitable at the **lowest** level

Feasibility

- 5 refers to the strategy/substrategy/procedure can be successfully implemented at the **highest** level
- 4 refers to the strategy/substrategy/procedure can be successfully implemented at the **high** level
- 3 refers to the strategy/substrategy/procedure can be successfully implemented at the **moderate** level
- 2 refers to the strategy/substrategy/procedure can be successfully implemented at the **low** level
- 1 refers to the strategy/substrategy/procedure can be successfully implemented at the **lowest** level

Strategies and Substrategies	Suitability					Feasibility					Comments / Suggestions
	1	2	3	4	5	1	2	3	4	5	
1. Redesign the curriculum to develop student innovation leadership skills											
1.1 Redesign learning outcomes in innovation leadership skills regarding Innovation Vision and Strategy, Innovation Recognition and Support, and Innovative Thinking.											
1.2 Promote the use of learning outcomes in course development related to innovation leadership skills regarding Innovation Vision and Strategy, Innovation Recognition and Support, and Innovative Thinking.											
2. Transform teaching and learning to develop student innovation leadership skills											
2.1 Transform in-classroom and out-classroom learning activities to develop student innovation leadership skills focusing on innovation vision and strategy, innovative thinking, and innovation recognition and support.											
2.2 Develop learning media and resources to develop student											

Key Strategies and Strategies	Suitability					Feasibility					Comments / Suggestions
	1	2	3	4	5	1	2	3	4	5	
3.1.4 Conduct performance assessment and authentic assessment, such as portfolios, project work, and event performance, with a focus with students' innovation leadership skills regarding innovation vision and strategy, innovative thinking, and innovation recognition and support.											
3.2 Promote assessment of student learning outcomes in innovation leadership skills focusing on innovation vision and strategy, innovative thinking, and innovation recognition and support.											
3.2.1 Formulate a policy on measurement and evaluation on courses that focus on student innovation leadership skills regarding innovation vision and strategy, innovative thinking, and innovation recognition and support.											
3.2.2 Use technology in the assessment on student innovation leadership skills regarding innovation vision and strategy, innovative thinking, and innovation recognition and support.											
3.2.3 Evaluate the assessment process implemented as set in the policy.											

Thank you very much for your valuable time.

Appendix is on NEXT PAGE!



Evaluation Form

Suitability and Feasibility of the Strategies (Second Draft) in Focus Group

Instruction:

1. This evaluation form is used in this focus group discussion.
2. This evaluation form is part of the doctoral program in Educational Management and is conducted to answer the fourth research objective of the dissertation title that is *“to develop academic management strategies of secondary schools based on the Concept of innovation leadership skills.”*
3. The evaluation form consists of two sections as follows:
 Section 1: Demographic information of the evaluator
 Section 2: Strategies, substrategies, and procedures of secondary schools’ academic management based on the concept of innovation leadership skills (second draft)
4. The discussion takes no more than 2 hours.
5. The information obtained from this focus group discussion will be analyzed and then used to develop the final version strategy.
6. Thank you very much for taking the time to participate in this focus group.

Mr. Nguon Siek
 Doctoral Candidate, Educational
 Management
 Faculty of Education, Chulalongkorn University

Contact:

Email: siek_nguon@yahoo.com

Operational Definitions of Terms

Innovation leadership skills: skills of an individual uses by herself/himself or influence others to make change or innovation, consisting of realizing innovation vision, strategic thinking, managing risk, demonstrating curiosity, developing empathy for others, opportunity exploration, assaulting assumptions, idea generation, idea championing, idea application, proactive thinking, leading courageously, leading by example, promoting a culture of trust, and recognizing innovators.

Realizing innovation vision: the ability to define and convey the innovation strategy to members, as well as build it into reality.

Strategic thinking: the ability to perform the environmental analysis and seek learning opportunities in areas considered strategic, as well as bring a strategic perspective to the innovation process.

Managing risk: the ability to identify blind spots missed previously and formulate plans to avert the risk.

Demonstrating curiosity: the ability to keep knowledge and skills current and actively take the initiative to learn new information, demonstrating engagement and loyalty to goals.

Developing Empathy for others: the ability to understand the end user's problems and what they want to accomplish.

Opportunity exploration: the ability to identify new opportunities and/or a problem needed to be solved.

Assaulting assumptions: the ability to move beyond habitual thinking blocks and continuously challenge the status quo and personal, professional, and industry assumptions.

Proactive thinking: the ability to illuminate emerging trends and turn them into new opportunities by understanding and analyzing the developments applied to their own environment.

Idea generation: the ability to use own novel thinking capabilities and support members to generate ideas on innovation through various techniques.

Idea championing: the ability to sell a new idea through personal commitment, persuasive communication, as well as potential alliances.

Idea application: the ability to bring the new supported idea into practice and make innovation a regular part of daily operation.

Leading courageously: the ability to lead with confidence and authority, accept responsibility for making challenging decisions, engage and maintain audience attention in high-stakes meetings and discussions, as well as do not avoid conflicts and differences of opinion.

Leading by example: the ability to act as a role model and unconventionally related to innovation that causes members to engage in such behaviors.

Promoting a culture of trust: the ability to believe in members and embrace failure on innovation, as well as eliminate challenges to innovation creation faced by members.

Recognizing the innovators: the ability to use a reward system for contributing to innovation.

Academic management: curriculum development, teaching and learning, and measurement and evaluation to develop students' innovation leadership skills.

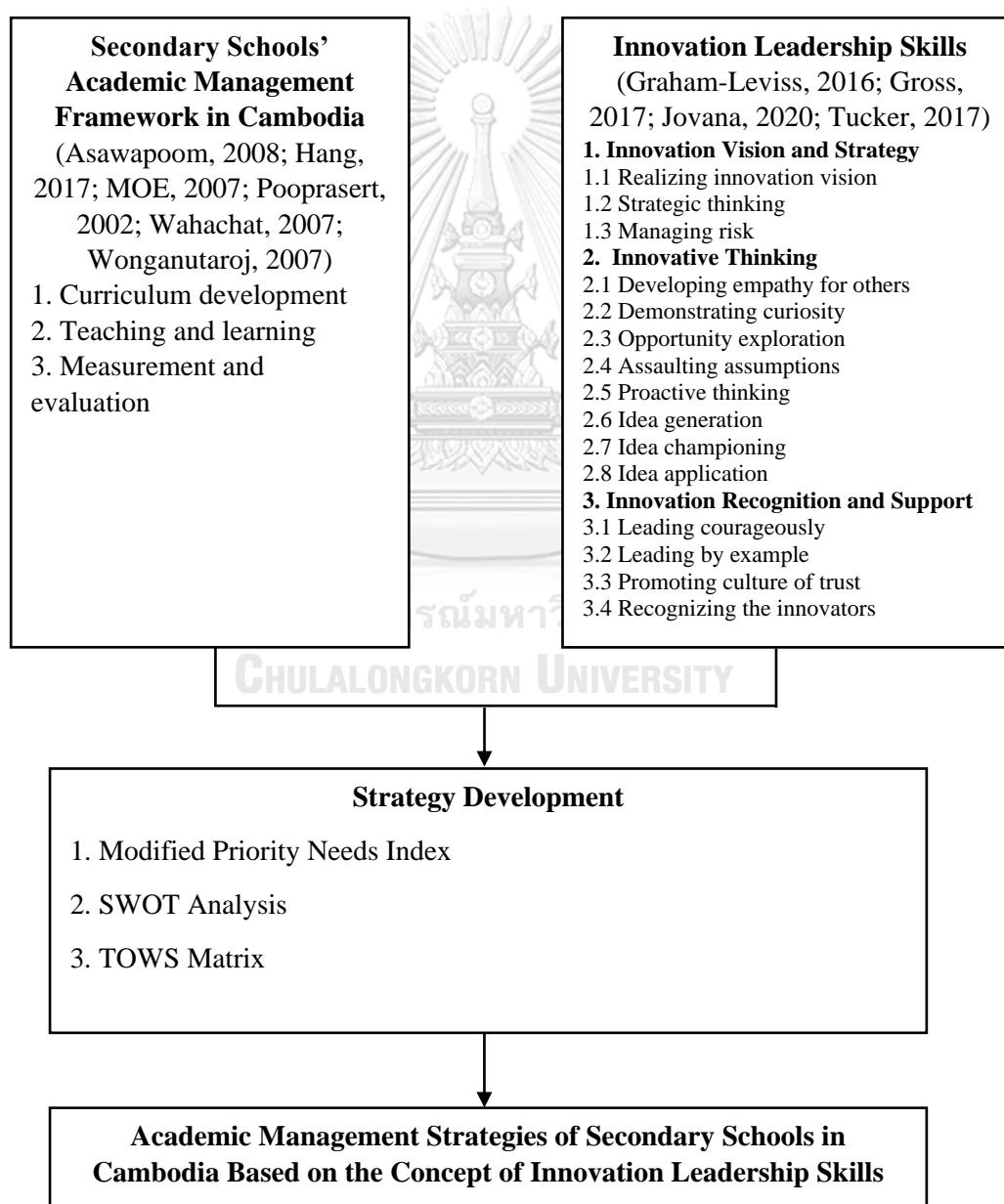
Curriculum development: Identifying learning outcomes in the curriculum and using learning outcomes in course development to develop the students' innovation leadership skills.

Teaching and learning: Using learning media and resources and organizing learning activities to develop the students' innovation leadership skills.

Measurement and evaluation: Setting evaluation criteria and constructing measuring tools and assessing learning outcomes to develop the students' innovation leadership skills.

Academic management strategies: proactive approaches to academic management based on strengths, weaknesses, opportunities, and threats (SWOT).

Conceptual Framework of the Study



Research Objectives

1. To study conceptual frameworks of academic management of secondary schools and innovation leadership skills
2. To study innovation leadership skills levels of secondary school students
3. To analyze strengths, weaknesses, opportunities, and threats of academic management of secondary schools based on the concept of innovation leadership skills
4. To develop academic management strategies of secondary schools based on the concept of innovation leadership skills

Summary of Research Phases

1. Study conceptual frameworks of academic management of secondary schools and innovation leadership skills
2. Study innovation leadership skills levels of secondary school students
3. Study current, desirable states, and priority needs of academic management of secondary schools
4. Analyze strengths, weaknesses, opportunities, and threats (SWOT) of academic management of secondary schools based on the concept of innovation leadership skills
5. Match TOWS matrix of academic management of secondary schools based on the concept of innovation leadership skills
6. Draft academic management strategies of secondary schools based on the concept of innovation leadership skills (first draft) by the researcher
7. Evaluate suitability and feasibility of academic management strategies of secondary schools based on the concept of innovation leadership skills (first draft) by experts individually
8. Draft academic management strategies of secondary schools based on the concept of innovation leadership skills (second draft)
9. Evaluate suitability and feasibility of academic management strategies of secondary schools based on the concept of innovation leadership skills (second draft) by a focus group discussion (in progress)
10. Develop academic management strategies of secondary schools based on the concept of innovation leadership skills (Final Version)

Strategy Development Principles

- 1) Strategies are developed based on the conceptual framework of academic management of secondary schools, consisting of curriculum development, teaching and learning, and measurement and evaluation.
- 2) Substrategies are developed based on the strategies and values of the PNI_{modified} of components and subcomponents of innovation leadership skills that are weaknesses, which need to be developed first, and the top three lowest mean scores of students' innovation leadership skills levels.
- 3) Procedures are developed based on the results of the internal environment and the external environment analysis and the content analysis of open-ended question answers in the questionnaire and relevant literature.

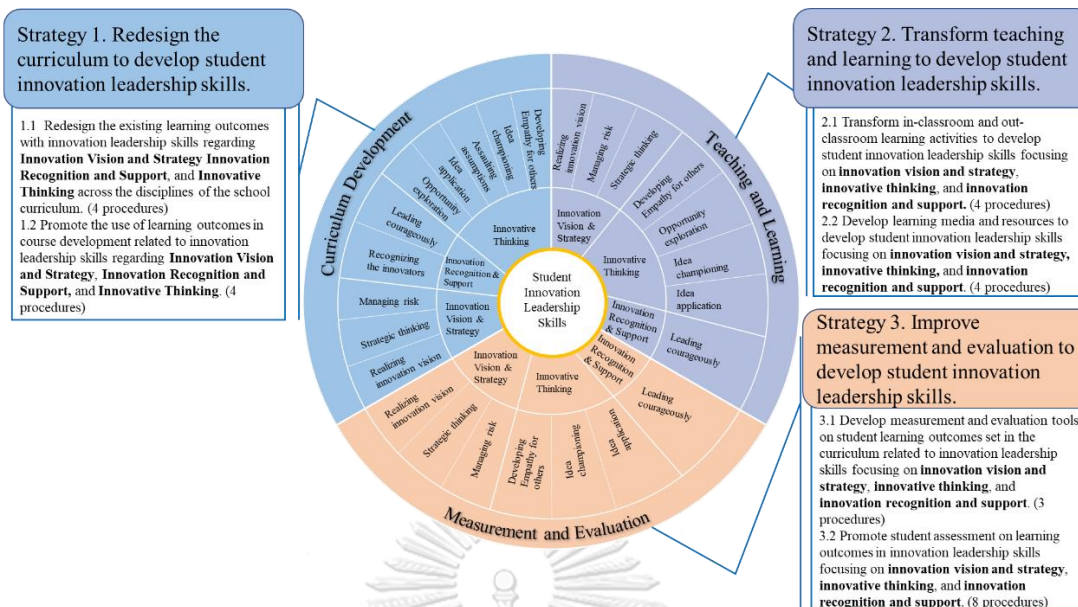


Figure 1. Academic Management Strategies of Secondary Schools in Cambodia Based on the Concept of Innovation Leadership Skills (in overall aspect)

Section 1: Demographic Information of the Interviewee

Name-Surname:

Education Level: Major:

Current position:

Workplace:

Work experience in the current position (years)

Tel: Tel (Telegram):

Email:

Section 2: Strategies, substrategies, and procedures of secondary schools’ academic management based on the concept of innovation leadership skills

Instruction: Please tick (✓) in the column “Suitability” and “Feasibility” that is true for your opinion.

Strategy, Substrategy, and Procedure	Suitability		Feasibility		Comments / Suggestions
	Suitable	Should be improved	Feasible	Should be improved	
Strategy 1: Redesign the curriculum to develop student innovation leadership skills					
Substrategy 1.1: Redesign the existing expected learning outcomes with innovation leadership skills regarding <i>Innovation Vision and Strategy, Innovation Recognition and Support, and Innovative Thinking</i> across the disciplines of the school curriculum.					
1.1.1 Form a school committee on curriculum development that include both internal and external					

Strategy, Substrategy, and Procedure	Suitability		Feasibility		Comments / Suggestions
	Suitable	Should be improved	Feasible	Should be improved	
stakeholders to set school policies and plans on the curriculum that focuses on students' innovation leadership skills regarding <i>Innovation Vision and Strategy</i> , <i>Innovation Recognition and Support</i> , and <i>Innovative Thinking</i> .					
1.1.2 Design innovation hub curriculum and interdisciplinary curriculum for creating young innovation leaders who are supposed to have skills of <i>Innovation Recognition and Support</i> , <i>Innovative Thinking</i> , and <i>Innovation Vision and Strategy</i> .					
1.1.3 Conduct workshops on new curricular (i.e., innovation hub curriculum and interdisciplinary curriculum) for all stakeholders before implementation to avoid misunderstanding.					
1.1.4 Monitor and evaluate the implementation of the new curricular.					
Substrategy 1.2: Promote the use of learning outcomes in subject development related to innovation leadership skills regarding <i>Innovation Vision and Strategy</i> , <i>Innovation Recognition and Support</i> , and <i>Innovative Thinking</i> .					
1.2.1 Integrate expected learning outcomes related to student innovation leadership skills regarding <i>Innovation Recognition and Support</i> , <i>Innovative Thinking</i> , and <i>Innovation Vision and Strategy</i> into the subjects in the curriculum and constantly revise and improve the use of learning outcomes in subject development.					
1.2.2 Develop and open elective subjects with the content of student innovation leadership skills regarding <i>Innovation Recognition and Support</i> , <i>Innovative Thinking</i> , and <i>Innovation Vision and Strategy</i> .					
1.2.3 Conduct training for teachers on subject integration and elective subjects.					
1.2.4 Evaluate the implementation of subject integration and elective subjects.					
Strategy 2: Transform teaching and learning to develop student innovation leadership skills					
Substrategy 2.1: Transform in-classroom and out-classroom learning activities to develop student innovation leadership skills focusing on <i>innovation vision and strategy</i> , <i>innovative thinking</i> , and <i>innovation recognition and support</i> .					
2.1.1 Conduct training and development programs for teachers on new teaching methods focusing on experiential learning.					
2.1.2 Design classroom learning activities based on problem-based learning, project-based learning, collaborative learning or cooperative learning, service learning, and hands-on learning and					

Strategy, Substrategy, and Procedure	Suitability		Feasibility		Comments / Suggestions
	Suitable	Should be improved	Feasible	Should be improved	
extracurricular activities focusing on innovation and leadership, including competitions (e.g., project work), events of networking and invitation of guest speakers, and seminars and workshops emphasizing desired learning outcomes regarding <i>innovation vision and strategy, innovative thinking, and innovation recognition and support</i> .					
2.1.3 Engage local businesses and organizations as well as community in the learning process, such as project-based learning and workshops and seminars to give students opportunities for working out the real-world problems.					
2.1.4 Monitor and evaluate the implementation of classroom learning activities and extracurricular activities using key performance indicators (KPI).					
Substrategy 2.2: Develop learning media and resources to develop student innovation leadership skills focusing on <i>innovation vision and strategy, innovative thinking, and innovation recognition and support</i> .					
2.2.1 Formulate a school policy on the use of learning media and resources that encourages teachers to understand and use them effectively.					
2.2.2 Conduct training for teachers on how to use learning media and resources in developing innovation leadership skills of the students.					
2.2.3 Design learning media and resources that facilitate classroom learning activities and extracurricular activities as well as allow students to work on their own as a self-directed learner and work in a group work, such as a maker space, real-world problem-solving space, and simulation space, with focus on <i>innovation vision and strategy, innovative thinking, and innovation recognition and support</i> .					
2.2.4 Evaluate the effectiveness of learning media and resources used by teachers and students through, such as a survey and interview on satisfaction and research on causal relationship between learning media and resources and student learning.					
Strategy 3: Improve measurement and evaluation to develop student innovation leadership skills					
Substrategy 3.1: Develop measurement and evaluation tools on student learning outcomes set in the curriculum related to innovation leadership skills focusing on <i>innovation vision and strategy, innovative thinking, and innovation recognition and support</i> .					
3.1.1 Conduct training for teachers about					

Strategy, Substrategy, and Procedure	Suitability		Feasibility		Comments / Suggestions
	Suitable	Should be improved	Feasible	Should be improved	
developing measurement and evaluation tools, used in the formative evaluation, particularly authentic assessment.					
3.1.2 Form a committee for setting a policy on measurement and evaluation on student learning outcomes regarding <i>innovation vision and strategy</i> , <i>innovative thinking</i> , and <i>innovation recognition and support</i> .					
3.1.3 Engage external stakeholders in the measurement and evaluation tool development.					
Substrategy 3.2: Promote assessment of student learning outcomes in innovation leadership skills focusing on <i>innovation vision and strategy</i> , <i>innovative thinking</i> , and <i>innovation recognition and support</i> .					
3.2.1 Conduct training for teachers about measurement and evaluation techniques.					
3.2.2 Develop a guideline for innovation leadership skills assessment.					
3.2.3 Apply assessment for learning (i.e., formative assessment), including self-assessment, peer-assessment, performance assessment, and authentic assessment, such as portfolios, project work, and event performance and provide creative feedback to improve student learning on a regular basis, such as monthly and mid-semesterly, emphasizing desired learning outcomes regarding <i>innovation vision and strategy</i> , <i>innovative thinking</i> , and <i>innovation recognition and support</i> .					
3.2.4 Evaluate the implementation of measurement and evaluation techniques.					
3.2.5 Conduct training for teachers on using technology in the assessment.					
3.2.6 Use technology in the assessment on student innovation leadership skills regarding <i>innovation vision and strategy</i> , <i>innovative thinking</i> , and <i>innovation recognition and support</i> .					
3.2.7 Develop a guideline for using the technology in the assessment process.					
3.2.8 Evaluate the use of technology in the assessment process.					

Thank you very much for your valuable time.

Appendix E Permission Letters



No. 64.6/1885

Faculty of Education,
Chulalongkorn University
Phayathai Road, Pathumwan,
Bangkok 10330

27 April 2022

Dear Your Excellency Seang Pech, Ph.D.,

Subject: Request for Expert's Evaluation on Research Instrument

This is to certify that Mr. Nguon Siek is a Ph.D. student in Educational Management, Faculty of Education, Chulalongkorn University. He is conducting research entitled "Academic Management Strategies of Secondary Schools in Cambodia Based on the Concept of Innovation Leadership Skills" under the supervision of Professor Pruet Siribanpitak, Ph.D. and Associate Professor Sukanya Chaemchoy, Ph.D. To attain this, an expert evaluation of research instruments should be invoked.

In this regard, I would like to invite you to be an expert in evaluating the research instruments. The students will subsequently coordinate with you and provide more detail on this matter. Your kind consideration is highly appreciated.

Yours sincerely,

Wichai Sawekngam

(Assistant Professor Wichai Sawekngam, Ph.D.)

Associate Dean
Acting for Dean



No. 64.6/1874

Faculty of Education,
Chulalongkorn University
Phayathai Road, Pathumwan,
Bangkok 10330

27 April 2022

Dear Director of Kampong Chheuteal High School,
Subject: Request for Cooperation in Data Collection

This is to certify that Mr. Nguon Siek is a Ph.D. student in Educational Management, Faculty of Education, Chulalongkorn University. He is conducting research entitled "Academic Management Strategies of Secondary Schools in Cambodia Based on the Concept of Innovation Leadership Skills" under the supervision of Professor Pruet Siribanpitak, Ph.D. and Associate Professor Sukanya Chaemchoy, Ph.D. His contact information is as follows: telephone number +6695-390-5727, email siek_nguon@yahoo.com.

In this regard, the student researcher has to collect data from the school director, vice directors, teachers, and students using the questionnaires. The students will subsequently coordinate with you and provide more detail on this matter.

Accordingly, I would like to kindly request for your permission to allow this student researcher to collect data for academic purposes. Your cooperation will be highly appreciated.

Yours sincerely,

Wichai Sawekngam

(Assistant Professor Wichai Sawekngam, Ph.D.)

Associate Dean
Acting for Dean

Enclosure: Research Instruments

*Office of Curriculum Administration and Instructional Management (Graduate Students) and International Affairs,
Faculty of Education, Chulalongkorn University, Bangkok, Thailand Tel. 0.2218-2565 Ext. 6737*



No. 64.6/1875

Faculty of Education,
Chulalongkorn University
Phayathai Road, Pathumwan,
Bangkok 10330

27 April 2022

Dear Director of Battambang Provincial Department of Education, Youth and sport,
Subject: Request for Cooperation in Data Collection

This is to certify that Mr. Nguon Siek is a Ph.D. student in Educational Management, Faculty of Education, Chulalongkorn University. He is conducting research entitled "Academic Management Strategies of Secondary Schools in Cambodia Based on the Concept of Innovation Leadership Skills" under the supervision of Professor Pruet Siribanpitak, Ph.D. and Associate Professor Sukanya Chaemchoy, Ph.D. His contact information is as follows: telephone number +6695-390-5727, email siek_nguon@yahoo.com.

In this regard, the student researcher has to collect data from school directors, vice directors, teachers, and students at the secondary schools using the questionnaires. The students will subsequently coordinate with you and provide more detail on this matter.

Accordingly, I would like to kindly request for your permission to allow this student researcher to collect data for academic purposes. Your cooperation will be highly appreciated.

Yours sincerely,

Wichai Sawekngam

(Assistant Professor Wichai Sawekngam, Ph.D.)

Associate Dean
Acting for Dean



No. 64.6/4552

Faculty of Education,
Chulalongkorn University
Phayathai Road, Pathumwan,
Bangkok 10330

8 September 2022

Dear His Excellency Kimcheang Hong, PhD,

Subject: Request for Expert's Evaluation on (First Draft) Strategy

This is to certify that Mr. Nguon Siek is a PhD student in Educational Management, Faculty of Education, Chulalongkorn University. He is conducting research entitled "Academic Management Strategies of Secondary Schools in Cambodia Based on the Concept of Innovation Leadership Skills" under the supervision of Professor Pruet Siribanpitak, PhD and Associate Professor Sukanya Chaemchoy, PhD. To attain this, an expert evaluation of (first draft) strategy should be invoked.

In this regard, I would like to invite you to be an expert in evaluating the (first draft) strategy. The students will subsequently coordinate with you and provide more detail on this matter. Your kind consideration is highly appreciated.

Yours sincerely,

Handwritten signature of Wichai Sawekngam in cursive script.

(Assistant Professor Wichai Sawekngam, Ph.D.)

Associate Dean
Acting for Dean

Enclosures: Suitability and Feasibility of the (First Draft) Strategy, Evaluation Form

*Office of Curriculum Administration and Instructional Management (Graduate Students) and International Affairs,
Faculty of Education, Chulalongkorn University, Bangkok, Thailand Tel 0.2218-2565 Ext 6737*



No. 64.6/4891

Faculty of Education,
Chulalongkorn University
Phayathai Road, Pathumwan,
Bangkok 10330

3 October 2022

Dear His Excellency Sarom Mok, PhD,

Subject: Invitation for a Focus Group Discussion

This is to certify that Mr. Nguon Siek is a PhD student in Educational Management, Faculty of Education, Chulalongkorn University. He is conducting research entitled "Academic Management Strategies of Secondary Schools in Cambodia Based on the Concept of Innovation Leadership Skills" under the supervision of Professor Pruet Siribanpitak, PhD and Associate Professor Sukanya Chaemchoy, PhD. To attain this, an expert evaluation of (first draft) strategy should be invoked.

In this regard, I would like to invite you to join the focus group discussion on October 7, 2022 at 13:00-15:00 via the online protocol (Zoom). The student will subsequently coordinate with you and provide more detail on this matter. Your kind consideration is highly appreciated.

Yours sincerely,

A handwritten signature in cursive script, appearing to read "Wichai Sawekngam".

(Assistant Professor Wichai Sawekngam, Ph.D.)

Associate Dean
Acting for Dean

Enclosures: the (Second Draft) Strategy, Evaluation Form

*Office of Curriculum Administration and Instructional Management (Graduate Students) and International Affairs,
Faculty of Education, Chulalongkorn University, Bangkok, Thailand Tel. 0-2218-2565 Ext. 6737*



ព្រះរាជាណាចក្រកម្ពុជា
ជាតិ សាសនា ព្រះមហាក្សត្រ

ក្រសួងអប់រំ យុវជន និងកីឡា

លេខ: **២១៥០** អយក. រកកស

ថ្ងៃ **សុក្រ ១១ ខែ ឧសភា ឆ្នាំ ២០២២** ឆ្នាំខាល ចត្វាស័ក ព.ស.២៥៦៥
រាជធានីភ្នំពេញ ថ្ងៃទី **១៩** ខែ **ឧសភា** ឆ្នាំ **២០២២**

ជម្រាបជូន

- **ឯកឧត្តម លោកជំទាវ លោក លោកស្រីប្រធានអង្គការក្រោមឱវាទនិស្សិតក្រសួង**
- **លោកប្រធានមន្ទីរអប់រំ យុវជន និងកីឡារាជធានីភ្នំពេញ ខេត្តកំពង់ចាម កណ្តាល ស្វាយរៀង បន្ទាយមានជ័យ បាត់ដំបង កោះកុង ក្រចេះ និងខេត្តកំពង់ស្ពឺ**

កម្មវត្ថុ: សំណើផ្តល់កិច្ចសហការក្នុងការចុះប្រមូលទិន្នន័យសម្រាប់និរ្តេបបទបញ្ជប់ការសិក្សាថ្នាក់បណ្ឌិត របស់លោក សៀក ងួន បុគ្គលិកអប់រំនៃវិទ្យាស្ថានបច្ចេកវិទ្យាកំពង់ស្ពឺ។

តបតាមកម្មវត្ថុខាងលើ ខ្ញុំសូមជម្រាបជូន ឯកឧត្តម លោកជំទាវ លោក លោកស្រី ជ្រាបថា: លោក សៀក ងួន បុគ្គលិកអប់រំនៃវិទ្យាស្ថានបច្ចេកវិទ្យាកំពង់ស្ពឺ ជានិស្សិតថ្នាក់បណ្ឌិត ឯកទេសគ្រប់គ្រងអប់រំ នៅសាកលវិទ្យាល័យ ជុំឡាឡុងកន ព្រះរាជាណាចក្រថៃ បាននិងកំពុងសរសេរនិរ្តេបបទបញ្ជប់ការសិក្សា ក្រោមប្រធានបទ "យុទ្ធសាស្ត្រ ការគ្រប់គ្រងការសិក្សា នៃសាលារៀនមធ្យមសិក្សាតាមបញ្ញត្តិបំណិនភាពជាអ្នកដឹកនាំនានាវត្តមានក្នុងប្រទេសកម្ពុជា"។ ការសិក្សាស្រាវជ្រាវនេះ នឹងត្រូវចុះប្រមូលទិន្នន័យពីបុគ្គលិកអប់រំនៅតាមគ្រឹះស្ថានសិក្សាក្នុងរាជធានីភ្នំពេញ ខេត្តកំពង់ចាម កណ្តាល ស្វាយរៀង បន្ទាយមានជ័យ បាត់ដំបង កោះកុង ក្រចេះ និងខេត្តកំពង់ស្ពឺ និងព័ត៌មានត្រូវបានប្រមូលក្រោមឱវាទក្រសួង អប់រំ យុវជន និងកីឡា ដោយមានការបំពេញកម្រងសំណួរ ការសម្ភាស និងការប្រជុំក្រុម (Focus Group) ចាប់ពីថ្ងៃទី ០២ ខែឧសភា ឆ្នាំ២០២២ តទៅ។

អាស្រ័យដូចបានជម្រាបជូនខាងលើ សូម ឯកឧត្តម លោកជំទាវ លោក លោកស្រី ជ្រាប និងផ្តល់កិច្ចសហការ តាមការគួរ។

សូម ឯកឧត្តម លោកជំទាវ លោក លោកស្រី ទទួលនូវការគោរពស្មោះពីខ្ញុំ ។

រដ្ឋមន្ត្រីក្រសួងអប់រំ យុវជន និងកីឡា



បណ្ឌិតសភាចារ្យ ហង់ ជួន ណារ៉ុន

- បម្រុងជូន:**
- អគ្គនាយកដ្ឋាន ឧត្តមសិក្សា
 - អគ្គនាយកដ្ឋាន រដ្ឋបាល និងហិរញ្ញវត្ថុ
 - ឧទ្ធរណ៍យឯក ឧត្តមបណ្ឌិតសភាចារ្យរដ្ឋមន្ត្រី
- ដើម្បីជូនជ្រាបជាព័ត៌មាន-
 - កាលប្បវត្តិ
 - ឯកសារ វិទ្យាស្ថានបច្ចេកវិទ្យាកំពង់ស្ពឺ

VITA

NAME Nguon Siek

DATE OF BIRTH March 16, 1987

PLACE OF BIRTH Battambang province, Cambodia

INSTITUTIONS ATTENDED Master of Education in Educational Administration, Chulalongkorn University

HOME ADDRESS #270, 13 Makara Village, Prek Preahsdach Commune, Krong Battambang, Battambang province.

PUBLICATION

1. Yodpet, W., Salvador Quetzal, A., Siek, N., Vebrina Sihite, F., Alegado, P. J. E., Balakrishnan, V., ... & Hollings, S. (2022). International education within ASEAN and the rise of Asian century. *Educational Philosophy and Theory*, 1-14.
2. Siek, N. (2021). Academic and student affairs collaboration for enhancing students' future work skills in Cambodian higher education. *Educational Management and Innovation Journal*. 4(1), 106-124.
3. Siek, N. (2015). Guidelines for the competency development of secondary school directors under the jurisdiction of Phnom Penh Municipal Department of Education, Youth and Sport, the Kingdom of Cambodia. *An Online Journal of Education*, 10(3), 159-173.