



CHAPTER V

Case company's new accessory development decision model

5.1 The questionnaire 1 and its result

The questionnaire 1

A questionnaire was used to confirm the understanding of factors relevance to accessory development decision as well as to get feedback on the current accessory decision model from 35 recipients (product marketing personnel, customer service department marketing personnel and few other related functions personnel) who directly involved in the case company's accessory business in 11 countries throughout the region.

The questionnaire consists of 11 questions. 9 of them are closed questions using both rating and choices. Wording used are easy to understand and user can spend only a short period of time to answer the questions. Most of the questions are designed to confirm the current understanding and the regionalization direction management team decided to pursue. After the questionnaire is drafted, it was verified by the case company's accessory manager and product planning team. The questionnaire was modified before sending out by electronic mail to the respondents (see Appendix A). One week was given for the feedback. Upon the results given from the respondents there are also additional information provided from respondents interview which are benefit to the decision model development.

In addition to some analysis and interpretation done in chapter 4, the rests are discussed in the following topic.

5.2 Data collected from the questionnaire 1

More than one choice can be chosen in the case that the respondents agree with the answers. Data was collected and the results confirm the understanding about the best accessory development practice as below.

Score	Why do you think regionalization development is useful?
<u>26</u>	Reduce development cost
<u>11</u>	Increase product consistency and quality
<u>7</u>	Be one regional team as per company's direction
<u>5</u>	Solve resource issues

- Regionalization product development first aim is to reduce product development cost and thus be able to provide competitive price to customers with a better economy of scales. It is also important that the product is designed to acceptable quality level for the whole region.

Score	What kind of part should be developed by regional team?
<u>19</u>	Base parts can be sold in all countries
<u>16</u>	Safety related parts
<u>11</u>	New technology/fashionable parts

- Parts that local team would like to have regional team developed are base parts which have been proved good sells in the past and that are provided by competitors in the market. However, the level of communize between countries will need to be determine. For example, between Australia and ASEAN, the base parts are 70% in common. Each vehicle line also has different accessory line up. Safety related parts are second priority which is better to integrate the design and development to base program vehicle to reduce claims risks and vehicle interference issues. It is also possible that regional accessory team lead the development of safety related items

but it should be with close guidance from base vehicle team in order to avoid addition and high test costs. New technology and fashionable products are last priority. The nature of those products is the rapid introduction and short product life cycle. Fashion is also defined differently in each market. It is better that regional team supports local development by providing information needed as well as help to evaluate local supplier's product in case needed. Having all accessories developed by regional team will waste resource and might not be able to catch up such short development timing and the frequent changes of needs.

Score Which logistic route do you think is best for accessory business?

<u>21</u>	Supplier -> FCSD (buyer country) -> dealer
<u>14</u>	Supplier -> FCSD (supplier country) -> FCSD (buyer country) -> dealer

- It is obvious the reduction of pass points in the supply chain can help to reduce logistics cost. However, to be able to have customer service team in each country buy direct from supplier will need a capable supplier who can support different language as well as a good ordering process between suppliers and the case company since each supplier will have its own process and will have to handle different ordering process from different places. Moreover, ordering separately will reduce the volume of each shipment and might not be savings anymore. One recommendation to the case company is a good logistics structure and system that do not make profit but only mark up the costs to compensate resources need to run the system only. Logistics costs between countries should be studied carefully.

Score Which process do you think suits more to accessory business?

<u>22</u>	Fast, flexible, low cost
<u>13</u>	Integrated to base program, high quality, available at launch

- Fast, flexible and low cost accessories are what markets want. The result align with the study earlier that time to launch the product is important and final cost should be acceptable and comparable with competitors in the market. Since direction from management team is to integrate accessory development into base vehicle development, gates and deliverables should be confirmed and clear. The nature of accessory development should also be explained to base vehicle team so that some flexibility can remain with the accessory planning team.

Score	What are the reasons you think local development should be pursue?
<u>22</u>	Small volume and need to reduce development cost and time
<u>17</u>	Supplier highly capable so let supplier help to develop the part and warrantee for it
<u>11</u>	Domestic requirement only, no export opportunity

- Even though an accessory would be sold in one country, it doesn't mean that it has to be developed by local team. Regional accessory development should be able to support local team that seeks for aids. And in the case that the combination between financial investment, resource requirement and suppliers' capability matches, developing an accessory locally should also be encouraged.
- Reasons of low regional accessory sales penetration feedback by respondents are the high part cost, delay of launch timing as well as the sales team's capability and their understanding about accessory business. If the sales of accessories are assigned to either regional marketing and sales team or local marketing and sales team, a sense of ownership which will definitely help to encourage accessory sales will be established.

Score	What are current issues in selling accessory in your country?
26	Part price is higher than the competition
18	Part was delayed from launch timing
13	Sales team and dealers are not aware of the part availability
9	No commission for sales team
4	Part doesn't look unique or different enough
2	Sales target should be push to sales team
2	Got commission from after market, ownership of accessory sales
1	Not enough margin for dealers to make profit
1	No variety
0	Lot's of customer complain and return

— It can also be implied from the questionnaire 1 that the current accessories developed by regional team have no issue in quality.

Another question asked in the questionnaire is the comment on the accessory decision model. 83% of the respondents agree with the model but 50% said that the model is too complicate with too many gates while 3% completely disagree and suggest that the company pursue a stand alone accessory development team. 21% said that timing used in defining a project is very critical for accessory development. Other suggestions are that there is an opportunity to reduce product cost by lowering engineering specification of the product since there're very few issues about the current accessory quality. They think that the current specification might be too high for accessories. A person also suggests that even though the product will be lead by local team, sourcing direction should not be limited to the local market only. In the case that business case supports the sourcing strategy, sourcing anywhere in the region to develop suppliers' base should be pursue.

5.3 Modified decision making model

In order to understand the overall picture of the case company's new accessory development decision making, a framework based on the study of MCDM model is laid out.

Model assumptions

The main company's objectives on accessory development to be kept in considerations are

- Develop accessories on a regional consideration
- Develop accessories that makes money
- Only dealer fit accessories to be pursue for program approval
- Company look at accessory as a 3-4 year project and not included in company's long term plan
- Integration of accessory development to vehicle development makes the decision making process take place up front and along with vehicle's product development process and gates

Model boundary

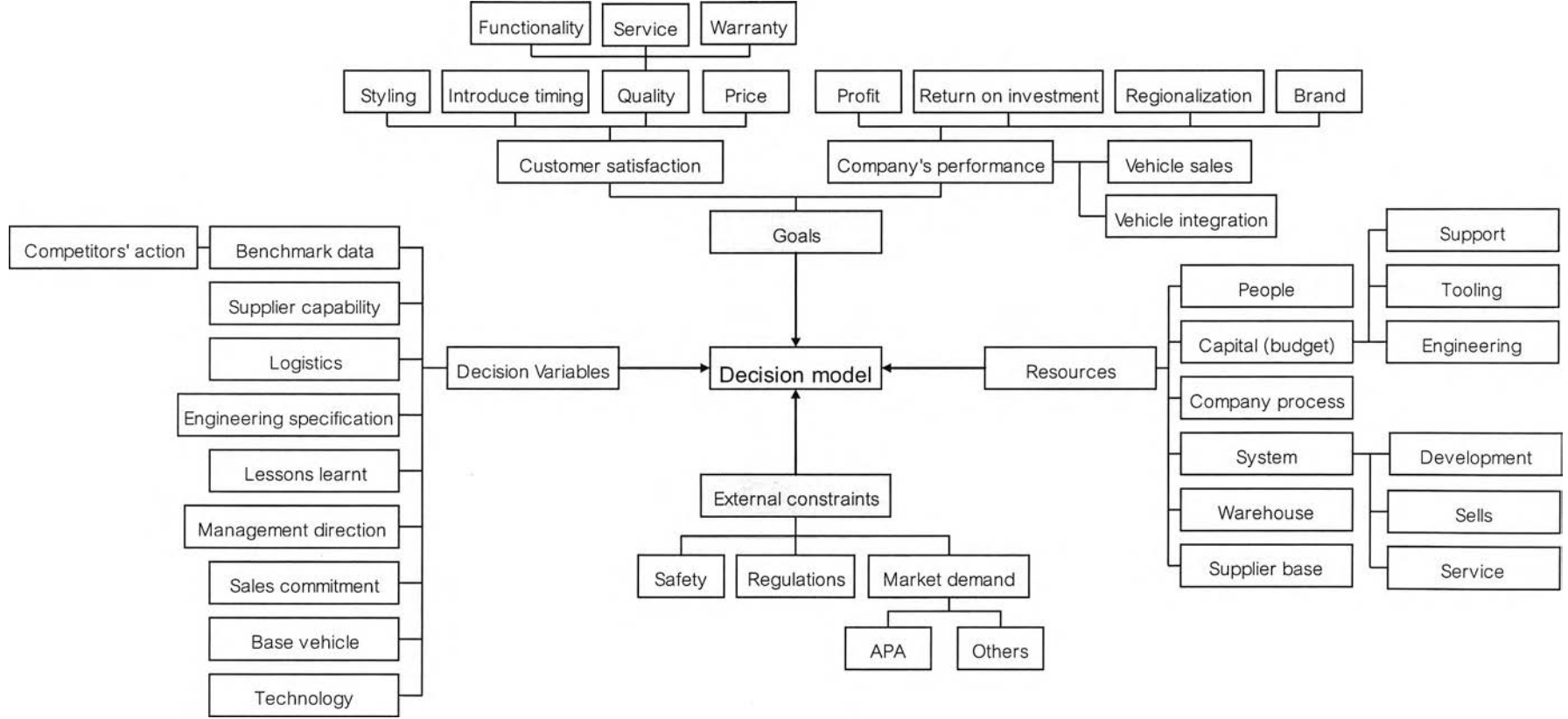
- The proposed model to be used only in APA (Asia Pacific and Africa) region as specified by the case company
- Logistics assumptions are based on central/regional organization agreement and might not be the most updated numbers in the business reality

Note that numbers used for calculations in this thesis are simplified and might not reflect the real numbers for confidential purpose

The MCDM model constraints has been drafted and discussed with product planning, marketing and case company's finance team. The constraints can be separated into 4 factors; decision variables, resources, goals and external constraints.

- 1) Decision variables: decision variables are based on the company and organization's experience in accessory development. It was found that in the case company, poor database system on accessory development information was handled. This will make it more difficult for the model input section since most of the data will be estimations and guesses and depends on the person who input to the model. Another key facilitator to the model input is the communication between accessory and base vehicle team. Engineering specification, vehicle sales commitment, base vehicle design structure and information and latest technology put in the vehicle can increase or cut down choices of accessory initial item list.
- 2) Resources: case company's resource granted is different by the size of the project. Most of them are shared between base vehicle and accessory business. The main factor that will affect the decision model is the capital or budget granted to a project. From mid 2009, accessory organization does not have its own accessory development budget but to ask for it from base vehicle team. The situation made accessory development decision more difficult and it is predicted that the range of regional development accessory per vehicle line will be reduced from this constraint. Budget portion from vehicle team is not fixed and information from finance team is that it depends on the overall vehicle business balance and decision power remains with the vehicle Chief engineer and vehicle finance controller. Obviously accessory development will be a lower priority in Chief engineer's decision list.
- 3) Goals: goal can be separated into two sections; customer satisfaction and company's performance. On customer satisfaction side, the constraints are concluded from questionnaire 1. On company's performance side, it is based on the company's regionalization plan. From case company's current objective, company's financial performance is the most important factor to consider new product development.
- 4) External constraints: is what company needed to consider and is base line for any new product development.

Figure 66: Decision model constraints and assumptions



Based on lean NPI project management, integrated project team and knowledge management considerations, a combination of decision process flow and MCDM (optimization matrix) is proposed. By having a clear project and gates objectives and criteria in a standard process, duplication tasks are reduced, tasks that can be done together can be grouped, inefficient resource allocation can be eliminated, data are consistent and controllable and numbers of iterations and over processing are reduced.

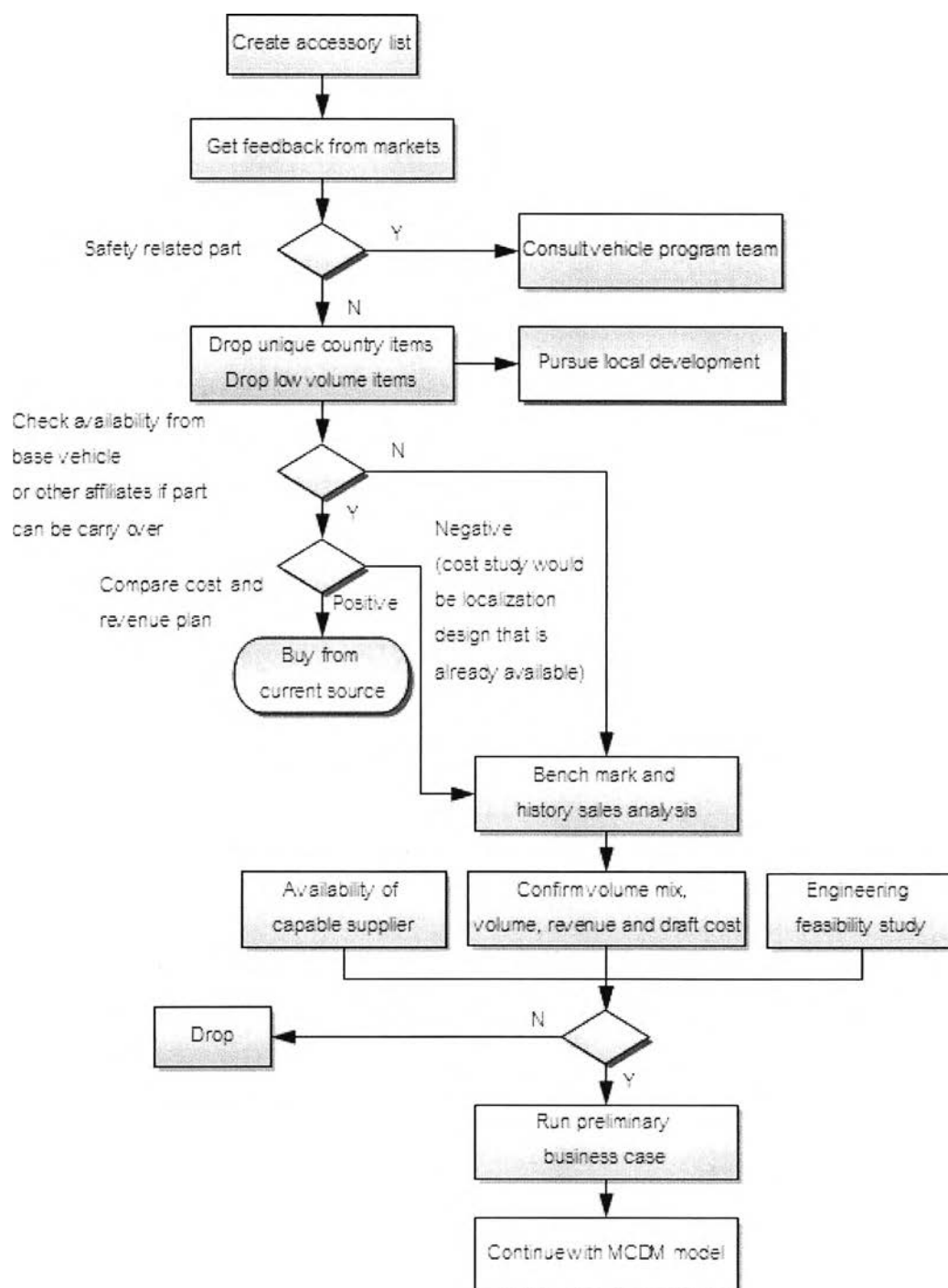


Figure 67: Modified decision process flow

Preliminary business case incorporates information as follow.

- Program assumption (Volume, volume mix, program duration, countries taking the part and their take rate, whole sale price expected by countries and whole sale price adjusted to the benchmark analysis)
- Cost assumptions (Piece cost, tooling cost, engineering and development cost, support team and engineering man hour)
- Supplier location, logistics and terms assumptions
- Calculation of draft landed cost, PBT (profit before tax) and expected payback period

*Note: 2010 assumption for PBT is to get a positive number and payback period under 12 months in order that program is considered.

5.4 Calculation work sheet for decision making model

MCDM Optimization model will incorporate information arranged according to the rating of importance from current product planning and accessory management team. Weights can be calculated using pair wise (AHP) method as follow.

Table 8: Scale for AHP preferences used in the calculation (Al-Harbi, 2001)

Scale/rating	Judgement
9	Extremely preferred
8	Very strongly to extremely
7	Very strongly preferred
6	Strongly to very strongly
5	Strongly preferred
4	Moderately to strongly
3	Moderately preferred
2	Equally to moderately
1	Equally preferred

5 factors are considered for pair wise analysis;

- Financial criteria > ATROS (After Tax Return On Sales): Company's profitability
- Financial criteria > Payback: Company's return on investment in payback period of month
- Marketing criteria > Base part: Parts that is introduced across plat form or standard part which is offered by other country, other region or competitor
- Financial criteria > Investment: Company's investment on tooling and engineering
- Marketing criteria > Vehicle integration / Marketing need: special request from either base vehicle team to complete the product or from marketing team in order to support product sale or support product's advertisement position or Special Value Package

Steps of the calculation is as follow

- 1) Decided on preference and priority over each other of the factors
- 2) Synthesize the pair wise comparison matrix and calculate priority vector for each factor
- 3) Use consistency index to check the consistency of the pair-wise comparison matrix
- 4) Summarize weight assigned to each factor

Table below shows preferences or priority over each other for each decision factor (agreed by product planning and management team)

Table 9: Pair wise comparison for accessory decision criteria

	ATROS	Payback	Benchmark	Investment	Vehicle integration/ Marketing need	
ATROS	1	1/2	3	4	5	
Payback	2	1	4	6	7	
Benchmark	1/3	1/4	1	1/3	2	
Investment	1/4	1/6	3	1	4	
Vehicle integration/ Marketing need	1/5	1/7	1/2	1/4	1	
Sum	3.7833	2.0595	11.5000	11.5833	19.0000	

Once the pair wise comparison is put in place, synthesizing the pair wise comparison is as follow.

Table 10: Synthesizing pair wise comparison for accessory decision criteria

	ATROS	Payback	Benchmark	Investment	Vehicle integration/ Marketing need	Sum
ATROS	0.2643	0.2428	0.2609	0.3453	0.2632	0.2753
Payback	0.5286	0.4855	0.3478	0.5180	0.3684	0.4497
Benchmark	0.0881	0.1214	0.0870	0.0288	0.1053	0.0861
Investment	0.0661	0.0809	0.2609	0.0863	0.2105	0.1409
Vehicle integration/ Marketing need	0.0529	0.0694	0.0435	0.0216	0.0526	0.0480

Note:

$$\text{Cell11} \quad 0.2643 = \frac{1}{(1 + 2 + 1/3 + 1/4 + 1/5)}$$

$$\text{Cell12} \quad 0.2428 = \frac{1/2}{(1/2 + 1 + 1/4 + 1/6 + 1/7)}$$

Summarizing row product, priority vector or weight which will be used in the weight sum calculation can be found. In this case it is

$$\begin{bmatrix} 0.2753 \\ 0.4497 \\ 0.0861 \\ 0.1409 \\ 0.0480 \end{bmatrix}$$

Calculate consistency index

$$0.2753 \begin{bmatrix} 1 \\ 2 \\ 1/3 \\ 1/4 \\ 1/5 \end{bmatrix} + 0.4497 \begin{bmatrix} 1/2 \\ 1 \\ 1/4 \\ 1/6 \\ 1/7 \end{bmatrix} + 0.0861 \begin{bmatrix} 3 \\ 4 \\ 1 \\ 3 \\ 1/2 \end{bmatrix} + 0.1409 \begin{bmatrix} 4 \\ 6 \\ 1/3 \\ 1 \\ 1/4 \end{bmatrix} + 0.0480 \begin{bmatrix} 5 \\ 7 \\ 2 \\ 4 \\ 1 \end{bmatrix} = \begin{bmatrix} 1.5621 \\ 2.5262 \\ 0.4332 \\ 0.7349 \\ 0.2456 \end{bmatrix}$$

Divided the index by their vector

$$1.5621 / 0.2753 = 5.674514$$

$$2.5262 / 0.4497 = 5.617771$$

$$0.4332 / 0.0861 = 5.031848$$

$$0.7349 / 0.1409 = 5.214369$$

$$0.2456 / 0.0480 = 5.117697$$

Average of the numbers are 5.33124

Consistency index (CI) is

$$CI = \frac{\text{average index by vector} - n}{n - 1} = \frac{5.33124 - 5}{5 - 1} = 0.08281$$

Select value of random consistency from table below (Al-Harbi, 2001)

Average random consistency (RI) [24–27]

Size of matrix	1	2	3	4	5	6	7	8	9	10
Random consistency	0	0	0.58	0.9	1.12	1.24	1.32	1.41	1.45	1.49

Consistency ration (CR) is

$$CR = \frac{CI}{RI} = \frac{0.08281}{1.12} = 0.073937$$

As the CR value is less than 0.1, the judgement of pair wise preference is consistence and acceptable. The weight to be used in the decision making calculation sheet can be summarized as follow.

Table 11: Accessory decision criteria weight summary

Priority	Item	Weight
1	Financial criteria: Payback	44.97%
2	Financial criteria: ATROS	27.53%
3	Financial criteria: Investment	14.09%
4	Marketing criteria: Base part	8.61%
5	Marketing criteria: Vehicle integration and marketing need	4.80%

It is apparent that the weight is high on financial criteria which are according to the case's company's business objective described earlier. The problem which can be foresee from this point is that marketing criteria accounts only 13% of the decision making criteria and thus marketing voice will be very low to decide any new product development. After discussion with base program finance team who will provide budget to fund the projects, they agreed with this weighting and also suggest keeping the prioritization of the criteria.

In order to complete the calculation worksheet, raw data is defined and converted to scaling constant as necessary. Suggestion is as follow.

— Financial criteria: Payback

Payback period can be calculated from business case study done by company's financial support team. Payback period ranges from 1 month to 'can't pay back' or positive infinite value. The criteria are

- Programs with payback period between 1-12 months to be considered for funding
- Programs with payback period between 13-24 months can be considered in case vehicle program has extra reserve budget but need justification and bench marking report from marketing team
- Programs above 25 months will not be considered by base program team for funding, marketing team will have to find other solution such as have supplier absorb tooling cost and re-run business case, have supplier develop the part and sale as supplier branded or consider to buy from other region if the part exist

Payback criteria to be converted to scaling constant as follow

Table 12: Payback criteria conversion scale

Payback period (month)	Scaling constant
1-12	5
13-24	3
24-28	1
28-32	0.5
33 and above	0

The reason to keep payback more than 24 in the equation is that

- Marketing team still need to use the prioritization of left items after base program funded to consider any additional accessory to pursue in other ways
- As mentioned earlier that the case company's database system is not good, planning team would like to keep parts as much as possible on the list just in case that the assumptions in the business case is wrong

(over estimation). This can be changed after the case company has more confidence on their input.

— Financial criteria: ATROS

ATROS can be calculated from business case study done by company's financial support team. It shows company's profitability in percentage. The result can be any integer. The more profitable, the better the investment should be done. As the number already presented in a scale of percentage, the number will be used directly. Note that negative ATROS items will likely be dropped.

— Financial criteria: Investment

Investment in this case only incurred tooling cost and engineering cost. Tooling cost to be paid to supplier while engineering cost consist of testing cost, sample part cost, logistics cost occurred during development. Finance team did not include labour hour or any other fixed cost in this criteria but all of those already been integrated in the business case analysis. According to the company's new product development investment criteria, there is already a set range of investment according to the level of management approval needed. It is as follow (from case company 2009 funding approval procedure).

Table 13: Capital investment scale for case company's base vehicle

Group	Capital	Group	Capital
6	> \$250M	3	\$2M to \$100M
5	\$150M to \$250M	2	\$0.2M to \$2M
4	\$100M to \$150M	1	≤ \$0.2M

Similarly, for accessory, range of investment will need to be arranged. However, as accessory would need a much lower investment per project comparing to vehicle development, only the scale to be applied. From historical data and experience of the planning team, scale for accessory to be assigned as follow.

Table 14: Capital investment conversion scale

Investment (US\$)	Scaling constant
$\leq 2,000$	5
2,000 to 20,000	4
20,000 to 100,000	3
100,000 to 200,000	2
$> 200,000$	1

Note: Historical investment data ranges from 0 (carry over item) to US\$500,000 (complex, safety related part) 10% of the overall accessories will use less than US\$25,000 while 50% of them used less than US\$85,000 and 80% will use less than US\$200,000 for investment. (Percentage is from overall accessory development projects)

— Marketing criteria: Base part

Base part factor sums up the numbers of countries' requests for the part, number of case company's regions interested in the part and number of competitors currently offering the same part in the market place. All of them are count and added to the number used in calculation. This factor is tricky and it is one of the tool marketing and product planning team wanted to show to engineering team that the part is wanted by the market. If not make it, company will loose business opportunity to other competitors as well as after market accessories. However, as the weight to this factor is not high, it did not gain much attention from engineering team but sometimes it can make engineering team go back and re-considered their development investment input and lower down some specification or change assumption.

— Marketing criteria: Vehicle integration and marketing need

Sometimes there is a special request from base vehicle team to accessory team to develop a part that can not be contained in the vehicle team. It can be that the part did not justify economy of scale in production level or can not find contracted

supplier to develop the part. Marketing team also has their input for some special actions using accessory. It is argued why this very low impact factor is still kept in the calculation. Engineering team's comment is that if planner and marketing person think hard before sending input to the vehicle team since the beginning of vehicle design phase, this kind of request might not exist. Finally, it was agreed to keep the factor since during the vehicle development, it is unsure whether or not there will be new technology or competitors' action attack to the vehicle already designed.

Numbers to be used in the calculation is agreed and defined in table below.

Table 15: Vehicle integration and marketing need conversion scale

Criteria	Scaling constant
Marketing or engineering team requests for the action to fulfil vehicle specification.	1
Marketing team requests for the action with justification of higher vehicle sales.	3
Engineering team requests for the action with justification and risk analysis.	5
Both engineering and marketing team agrees to take the action.	7
Engineering and marketing team agrees to take the action and there is an action from competitor threatening vehicle sales.	9

Note: It is noticed that in the beginning or initial phases, this criterion has not yet been used.