Preliminary Study of Knowledge Management (KM) Practices in Malaysian Automotive Industry

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Abstract: The paper covers a research in the knowledge management area for automotive industries. A preliminary study on the knowledge management was conducted in the local automotive companies for obtaining an initial overview of the practice of knowledge management in the Malaysian automotive industry. The 72 managers and engineers from six automotive companies in Malaysia were the respondents for this study. The data were interpreted on the basis of weighted scores for each parameter. The final conclusions then were prepared on the basis of a knowledge management index (KMI). The interpretation of data reveals that the knowledge management index (KMI) in the three knowledge management aspects of (i) information technology, (ii) knowledge acquisition, and (iii) understanding and commitment were the highest while the knowledge management index (KMI) for the two other aspects of knowledge management aspects of (i) mechanism of assessment and (ii) acknowledgement were the lowest among the eleven considered aspects. From this data interpretation, it can be concluded that the practice of knowledge management in the Malaysian automotive industry was still in the early stage and need to be improved in order to guarantee the competitive success in the competitive world today.

Keywords: knowledge, knowledge management, automotive industry, knowledge management index.

1. Introduction

The importance of knowledge management as a basis for competitive success should not be denied. Nowadays, the knowledge is considered as a dynamic resource and become valuable only when it is used [1]. According to Nonaka [2], in an economy, where the only certainty is uncertainty, the one sure source of lasting the competitive advantage is knowledge. Scholars in their study [3] agreed and added that the knowledge has been considered as an essential asset for the competitive advantage.

Knowledge management has penetrated the automotive industry around the world for many years. However, in order to allow the knowledge management to leverage effectively and to permeate across an organization, getting a knowledge management-based approach is important. At the same time, the effectiveness of knowledge management in industry needs to be observed again and again to ensure that no shortage exists. If any shortage is found, it should be improved and overcome with the appropriate efforts.

Hence, this study was conducted with the main purpose to obtain an initial overview of the practice of knowledge management in the Malaysian automotive industry. The initial overview will then be used as an initiator in implementing the efforts for improving the knowledge management in the automotive industry in the future.

2. Theoretical Background

2.1 Conceptual Understanding of Knowledge

Although the knowledge is considered as an important resource for competitive advantage in the modern organizations, no universal definition is given for knowledge yet. Duffy [4] had discussed about the knowledge in the data-information-knowledge continuum. The data is discussed as a set of discrete facts about an event, information as the data in a context, and knowledge as the information that is combined with the experience, context, interpretation, and reflection [4]. This is consistent with the definition given by Sunassee [5], maintaining that knowledge is the human expertise stored in a person's mind and gained through experience and interaction with the environment. However, according to Nonaka and Von Krogh [6], knowledge is explained as the actuality of skilful action and the potentiality of defining a situation so as to permit the skilful action. Besides, knowledge also has been defined as: (i) facts, information, and skills acquired through experience or education; or (ii) awareness or familiarity gained by experience of a fact or situation [7].

There are two types of human knowledge: explicit knowledge and tacit knowledge [2]. The explicit knowledge is objective and can be easily communicated and shared. Typically, it has been documented. On the other hand, the tacit knowledge is subjective and highly personal and is not easily expressed, and difficult to be communicated. It may also be impossible to be captured.

For the purpose of this study, knowledge is considered as the information owned by a person that is gained through interaction with environment.

2.2 Conceptual Understanding of Knowledge Management (KM)

There is no doubt that in the present scenario of rapidly changing technological advancement, now the focus is on knowledge management (KM). There is a variety of different definitions on knowledge management (KM) in the academic literature. According to Duffy [4], knowledge management (KM) is a systematic and organizationally specified process for acquiring, organizing, and communicating both the tacit

and explicit knowledge of employees so that the other employees may make use of it to be more effective and productive in their work. This is consistent with the definition given by Yip, Lau and Songip [8] holding that knowledge management (KM) is a process of managing the explicit and tacit knowledge in the organization for increasing the competitive advantages. However, according to Sunassee and Sewry [5], knowledge management (KM) is a process to identify, develop, and effectively apply the existing organizational knowledge to achieve the organizational goals, while creating an organizational culture that allows the creation of further knowledge. In addition, knowledge management (KM) is also defined as the process through which an organization generates value from its intellectual and knowledge-based assets [1].

For the purpose of this study, the above views are adopted. Knowledge management (KM) is considered as a process of managing the existing explicit and tacit knowledge in the organization, while creating an organizational culture that allows the creation of further knowledge, for increasing the competitive advantages.

2.3 Knowledge Management (KM) in the Automotive Industry

Undoubtedly, the Knowledge management (KM) has penetrated into the automotive industry for many years. However, so far there have been many companies with difficulties in managing their knowledge assets. For example, Nissan - Japanese multinational automotive manufacturer - has had to deal with a variety of different challenges in order to adopt and implement the efficient and reliable knowledge management (KM) practices. According to Daidj [9], there are two main groups of barriers to the knowledge management (KM) from the perspective of Nissan:

- People-related barriers:
  Culture, time, tacit knowledge, value identification, language, and preferential sharing,

- Organizational-related barriers:
  Strategy alignment, reward and recognition, allocation of resources, top management support, organizational structure, staff turnover, organizational culture, one directional KM, competition, and the power of management.

At the same time, Daidj [9] has also highlighted the people-related and organizational-related facilitators to the knowledge management (KM) from the perspective of Nissan:

- People-related facilitators:
  Perception change, culture, and dual commitment,

- Organizational-related facilitators:
  Organizational culture, business alignment, and structural changes.

2.4 Knowledge Management Index (KMI)

The knowledge management index (KMI) is a metric to assess the degree to which the organizations are engaged in the knowledge management (KM) [10]. Additionally, it has been proposed as a useful tool in helping the organizations to measure their knowledge management (KM) capabilities.

Crnkovic, Belardo and Asoh [10] presented a holistic approach to the knowledge management (KM) that relates the key knowledge management processes (KMP) and critical success factors (CSF). The Belardo's matrix (Figure 1) that enables the characterization of an organization and the estimation of knowledge management index (KMI) was created by juxtaposing these knowledge management processes (KMP) and critical success factors (CSF). In this matrix, the columns represent four typical knowledge management processes (KMP) and the rows represent four critical success factors (CSF).

	Identification	Elicitation	Dissemination	Utilization
Technology				
Leadership				
Culture				
Measurement				

Figure 1. Belardo's matrix

The joint interaction was captured by appropriate constructs that relate the knowledge management processes (KMP) to the actors (employees, customers, partners, and the environment of organization) and vice versa. For each construct, a number of questionnaire items were devised. In modelling the knowledge management index (KMI), the total number of questionnaire items that could be measured to examine the knowledge management (KM) as completely as possible were applied. In their survey, Crnkovic *et al.* [10] put two questionnaire items for each construct, bringing the total number of questionnaire items to 32.

According to Crnkovic *et al.* [10], the computation of knowledge management index (KMI) is as follows:
Suppose that there are a total of Q measures for all of the Z constructs. After administering the questionnaire, there are a series of measures with values r_α, $\alpha = 1\ldots Q$, with a minimum value s_{min} and a maximum value s_{max}, where s_{min} and s_{max} are the minimum and maximum value of the continuous measurement scale used to obtain the rating of items on the questionnaire. These measures are then used to compute the knowledge management index (KMI). The general approach is as follows:

i. The scores for all Q measures are summed. This results in a simple scale running from s_{min} (the least level of the interaction for all of the items) to $Q*s_{max}$ (if all of the items were scored at maximum level).

ii. Within each organization, the scores for all items are averaged to obtain the KMI, as KMI (organization) = $\sum r_\alpha / Q$.

Asoh [11] had applied the structural equation modelling (SEM) techniques in order to refine and cross validate the knowledge management index (KMI) presented by Crnkovic, Belardo and Asoh [10]. The results showed that

the refined knowledge management index (KMI) that was tested in a nomological network was stable and robust when cross validated. This demonstrating the consistent prediction results across the independent data sets.

In their study on knowledge management (KM) in the Indian information technology companies, Singh and Soltani [1] used the knowledge management index (KMI) as a tool to draw the final conclusion. The knowledge management index (KMI) was calculated by the following formula:

$$KMI = \frac{\sum wi \times 100}{niR}$$

where; w   :   weighted sum score,
        i   :   number of sub-parameters,
        n   :   number of respondents,
        R   :   maximum value of rating.

In this paper, the knowledge management index (KMI) was applied as it was seen as an ideal tool in drawing the final conclusion about the degree of awareness and implementation of knowledge management (KM) practices in the Malaysian automotive industry. Furthermore, the knowledge management index (KMI) has been proven as a robust and stable tool in helping the organizations to measure their knowledge management (KM) capability.

3. Methodology

3.1 Data Collection Tool

For this study, a questionnaire was used as the data collection tool. The objective of this questionnaire was to investigate the degree of awareness and implementation of knowledge management (KM) practices in the Malaysian automotive industry.

The questionnaire was adapted from the Singh and Soltani's questionnaire [1]. There were two sections in the questionnaire. The first section of questionnaire dealt with the background details of respondents and the second section dealt with the specific aspects of knowledge management. They included "Organizational Culture", "Understanding and Commitment", "Knowledge Acquisition", "Knowledge Usage", "Knowledge Sharing", "Information Technology", "Learning among People", "Learning within Organization", "Mechanism of Assessment", "Knowledge Management Architecture", and "Acknowledgement".

The 5-point Likert scale was used for this study. The respondents were asked to rate the specific aspects of knowledge management on a scale of one (1) to five (5). The scale of one (1) was referred to as "Strongly Disagree" while the scale of five (5) was referred to as "Strongly Agree".

3.2 Data Collection

For this study, the questionnaires were distributed to 200 respondents from eight automotive industry companies in Malaysia. However, only a total of 72 questionnaires from six automotive industry companies in Malaysia were returned. The managers at senior level or middle level and

the engineers were chosen as the targeted respondents for this study. The reason for the selection of managers and engineers to be the respondents for this study refers to the point that they seem as having a broad knowledge of all their organizations' functions, activities, and operating environment.

3.3 Data Interpretation

For this study, the responses were elicited on a pre-defined five-point rating scale. The data then were interpreted on the basis of weighted scores for each parameter and sub-parameter. The final conclusions were prepared on the basis of a knowledge management index (KMI), which can be calculated by the formula as in Singh and Soltani's [1].

The scores of knowledge management index (KMI) were then defined as in Table 1.

Table 1. Definition for Scores of Knowledge Management Index (KMI)

Score	Legend
90 – 100	Very Good
80 – 89	Good
60 – 79	Moderate
50 – 59	Low
0 – 49	Very Low

4. Result and Discussion

4.1 Background Details

The 72 managers and engineers from six automotive industry companies in Malaysia were the respondents for this study. 19 of the respondents were from Shah Alam, Selangor; 17 were from Rawang, Selangor; 14 were from Pekan, Pahang; 13 were from Tanjung Malim, Perak; 7 were from Gurun, Kedah; and 2 were from Kulim, Kedah. The size of companies was ranged from 800 to 1500 employees.

4.2 Organizational Culture

From Table 2, the knowledge management index (KMI) for organizational culture in the Malaysian automotive industry was 75.63%. This was calculated by putting the values in the formula mentioned before (sub-parameter for organizational culture was 4). By using the same way, the knowledge management index (KMI) was calculated for various parameters in this study.

This is "moderate" according to the pre-defined rating scale. From the responses, there was a perception that there is a need to document the experiences gained from the earlier projects in order to apply them for the future projects. In addition, the organizations believed that in order to augment the learning culture, the failure should be taken up as a learning opportunity. The chances to serve on the working group and contributing the ideas also should become the important things in the organizations.

4.3 Understanding and Commitment

In Table 3, it is shown that the knowledge management index (KMI) for understanding and commitment in the Malaysian automotive industry is 84.58%. This is "good" according to the pre-defined rating scale. It is concluded from the result that the knowledge management should become a policy in the organization. Therefore, the involvement of both the top management and the employees is seen as important in implementing and realizing the knowledge management process.

4.4 Knowledge Acquisition

Considering Table 4, the knowledge management index (KMI) for knowledge acquisition in the Malaysian automotive industry is 87.78%. This is "good" according to the pre-defined rating scale. It is clearly observed from S. No. 4, that the knowledge resides with the experts where they have the responsibility to disseminate it to the other people in the organization. However, from S. No. 1 and 3, it can be concluded that although the organizations are aware of the importance of documentation, only the critical information is documented and maintained in the archive while the general information is not documented.

Table 2. Organizational Culture

S. No.	Description	Rating Score					Weighted Sum	KMI (%)	KMI (Average)
		5	4	3	2	1			
1	There is a defined process in the company to document the experiences gained from the earlier performances and apply them for the future.	21	32	8	7	4	275	76.39	75.63
2	The failure is taken up as a learning opportunity to augment the learning culture.	27	23	7	11	4	274	76.11	
3	Everyone in the company has the chance to serve on working groups.	23	25	12	10	2	273	75.83	
4	The people's ideas for changes have been welcomed.	25	23	9	8	7	267	74.17	

Table 3. Understanding and Commitment

S. No.	Description	Rating Score					Weighted Sum	KMI (%)	KMI (Average)
		5	4	3	2	1			
1	The management has the vision to integrate the knowledge management process into the business plan.	32	28	6	4	2	300	83.33	84.58
2	The knowledge management programme follows the top-down approach instead of the bottom-up approach.	48	14	4	3	3	317	88.06	
3	The top management is committed to implement the knowledge management process.	35	29	4	3	1	310	86.11	
4	The employees are committed to implement the knowledge management process.	30	26	8	5	3	291	80.83	

Table 4. Knowledge Acquisition

S. No.	Description	Rating Score					Weighted Sum	KMI (%)	KMI (Average)
		5	4	3	2	1			
1	The effective cataloguing and archiving procedures are in place for the document management.	37	29	3	2	1	315	87.50	87.78
2	Training on the new systems focuses on how these technologies can be used to improve the quality and efficiency of people at work.	38	29	2	2	1	317	88.06	
3	The groups and the individuals are routinely document and share the information about their expertise.	24	30	8	6	4	280	77.78	
4	The experts play a role in identifying, collecting, classifying, and disseminating the important information for the other users.	65	6	1	0	0	352	97.78	

Table 5. Knowledge Usage

S. No.	Description	Rating Score					Weighted Sum	KMI (%)	KMI (Average)
		5	4	3	2	1			
1	There exists an explicit mechanism to translate the ideas for furtherance of the business goals.	10	27	22	4	9	241	66.94	72.36
2	The thorough consideration is given to the all innovative ideas, no matter where they come from.	24	30	8	6	4	280	77.78	

Table 6. Knowledge Sharing

S. No.	Description	Rating Score					Weighted Sum	KMI (%)	KMI (Average)
		5	4	3	2	1			
1	The face-to-face interactions are used to transfer the 'difficult to articulate' tacit knowledge.	22	32	9	6	3	280	77.78	76.04
2	The information technology facilitates the knowledge sharing through the various tools in the organization.	29	23	10	7	3	284	78.89	
3	There are cross-functional groups to promote the sharing of knowledge.	11	27	21	9	4	248	68.89	
4	There is a programme of active participation in the business conferences and other discussion forums to share and learn the ideas and experiences.	17	40	10	3	2	283	78.61	

4.5 Knowledge Usage

Based on Table 5, the knowledge management index (KMI) for knowledge usage in the Malaysian automotive industry was 72.36%. This is "moderate" according to the pre-defined rating scale. From the result, it can be concluded that although the thorough consideration is given to the all innovative ideas in the organization, the existence of explicit mechanism to translate that ideas for furtherance of the business goals still needs to be improved.

4.6 Knowledge Sharing

According to Table 6, the knowledge management index (KMI) for knowledge sharing in the Malaysian automotive industry is 76.04%. This is "moderate" according to the pre-defined rating scale. The knowledge sharing still needs to be improved in order to spark off a positive change in the culture of the organization. From the responses it is shown that the information technology has facilitated the knowledge sharing in the organizations. In addition, the various business conferences and discussion forums were also seen as necessary to the organizations for knowledge sharing.

4.7 Information Technology

Table 7 shows that the knowledge management index (KMI) for information technology in the Malaysian automotive industry is 92.99%. This is "very good" according to the pre-defined rating scale. This result indicates that the organizations have extensively used the information technology as a tool for effective knowledge sharing and information dissemination. This can be seen from S. No. 4 where the Internet has been extensively used for the purpose of knowledge sharing and from S. No. 3 where the software has been extensively used as a knowledge tool while designing.

Table 7. Information Technology

S. No.	Description	Rating Score					Weighted Sum	KMI (%)	KMI (Average)
		5	4	3	2	1			
1	The information technology is a key enabler in ensuring that the right information is available to the right people at the right time.	53	14	3	1	1	333	92.50	92.99
2	A high level of systems integration exists.	50	11	9	1	1	324	90.00	
3	The organization is extensively uses the software (e.g. CATIA, CAD) as a knowledge tool while designing.	53	12	5	1	1	331	91.94	
4	The organization is extensively uses the Internet (intranet and/or extranet) for information/knowledge sharing.	65	5	2	0	0	351	97.50	

Table 8. Learning among People

S. No.	Description	Rating Score					Weighted Sum	KMI (%)	KMI (Average)
		5	4	3	2	1			
1	People have a high tolerance for the complexity.	7	14	36	9	6	223	61.94	
2	People are willing to experiment.	7	17	33	9	6	226	62.78	
3	People continually search for the ways to do the things cheaper, better, and faster.	9	36	14	7	6	251	69.72	71.74
4	People use the information technology effectively in pursuing the knowledge.	53	14	3	1	1	333	92.5	

Table 9. Learning within Organization

S. No.	Description	Rating Score					Weighted Sum	KMI (%)	KMI (Average)
		5	4	3	2	1			
1	The organization's learning process includes gathering the feedback from the customers.	28	35	4	3	2	300	83.33	
2	The organization has someone responsible for the knowledge management.	2	29	38	2	1	245	68.06	
3	The learning through the seminars, training, and deputation abroad are applied to the workplace after due customisation.	24	37	6	3	2	294	81.67	78.68
4	The organization devotes its time and resources to the training and education.	25	35	7	3	2	294	81.67	

4.8 Learning among People

As seen in Table 8, the knowledge management index (KMI) for learning among people in the Malaysian automotive industry is 71.74%. This is "moderate" according to the pre-defined rating scale. From S. No. 4, again it is clear that the use of information technology among the people is effective in pursuing the knowledge. However, the people still need to improve themselves in the aspects of complexity tolerance as well as willing to experiment.

4.9 Learning within Organization

As Table 9 shows, the knowledge management index (KMI) for learning within organization in the Malaysian automotive industry is 78.68%. This is "moderate" according to the pre-defined rating scale. The organizations have stated that the gathering of feedback from the customers is one of their learning processes. In addition, they also have focused their time and resources to the learning aspect such as seminar and training. However, they relatively have no someone responsible for the knowledge management.

4.10 Mechanism of Assessment

Table 10 shows that the knowledge management index (KMI) for mechanism of assessment in the Malaysian automotive industry is 66.67%. This is "moderate" according to the pre-defined rating scale. This result indicates that the mechanism for assessing the transfer of acquired knowledge to the workplace have not yet reached the desired level. A formal mechanism should be developed and evolved for monitoring the transferability of knowledge to the workplace.

Table 10. Mechanism of Assessment

S. No.	Description	Rating Score					Weighted Sum	KMI (%)	KMI (Average)
		5	4	3	2	1			
1	There is a review mechanism to assess whether the acquired knowledge is being transferred to the workplace.	6	24	32	8	2	240	66.67	66.67

Table 11. Knowledge Management Architecture

S. No.	Description	Rating Score					Weighted Sum	KMI (%)	KMI (Average)
		5	4	3	2	1			
1	The company's knowledge management architecture is reliable and self-sustainable in nature.	10	28	24	8	2	252	70.00	70.00

Table 12. Acknowledgement

S. No.	Description	Rating Score					Weighted Sum	KMI (%)	KMI (Average)
		5	4	3	2	1			
1	The knowledge management mechanism is inbuilt in the performance management system of the company.	11	24	20	11	6	239	66.39	65.14
2	The individuals are rewarded for their teamwork and knowledge sharing.	7	24	26	6	9	230	63.89	

4.11 Knowledge Management Architecture

Based on Table 11, the knowledge management index (KMI) for knowledge management architecture in the Malaysian automotive industry is 70.00%. This is "moderate" according to the pre-defined rating scale. This result indicates that the people have become increasingly mature in the concept of knowledge management. However, this maturity level is still relatively inadequate and should be improved for ensuring the competitive success of organization.

4.12 Acknowledgement

Finally, according to Table 12, the knowledge management index (KMI) for acknowledgement in the Malaysian automotive industry is 65.14%. This is "moderate" according to the pre-defined rating scale. This result indicates that the individuals were not visibly rewarded for their teamwork and knowledge sharing. Moreover, the knowledge management mechanism has not been clearly inbuilt in the performance management system of organization.

5. Conclusion

The initial overview of the practice of knowledge management in the Malaysian automotive industry is finally revealed through this study. The knowledge management index (KMI) for the three aspects of knowledge management - (i) information technology, (ii) knowledge acquisition, and (iii) understanding and commitment - is high. Knowledge management has been agreed to become a policy in the Malaysian automotive industry. In implementing and realizing it, the involvement of both the top management and employees is necessary. In addition, the information technology is seen as a tool of effective knowledge sharing and information dissemination. However, it becomes clear that although the industry is aware of the importance of documentation, much needs to be done in this field. It is because, up to now, only the critical information has been documented and maintained in the archive while the general information has not been documented.

The knowledge management index (KMI) for the two aspects of knowledge management in (i) mechanism of assessment and (ii) acknowledgement is low. It is clear that in the Malaysian automotive industry, the mechanism for assessing the transfer of acquired knowledge to the workplace has not yet reached the desired level. Therefore, a formal mechanism should be developed and evolved for monitoring the transferability of knowledge to the workplace. In addition, up to now, the individuals have not been visibly rewarded for their teamwork and knowledge sharing.

Overall, it can be concluded that the practice of knowledge management in the Malaysian automotive industry is still at the early stage. Much remains to be done to improve the practice of knowledge management in this industry in order to ensure their competitive success in the competitive world today. Therefore, the future work will be focused on the effort to develop a model of knowledge management strategy for the automotive industry in particular. The development of this model is expected to give a clear idea to the industry on how to proceed with the knowledge management in the best way.

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