



PRIORITIZATION OF IDEAS IN AN AFFINITY DIAGRAM BY THE AHP: AN EXAMPLE OF K-ECONOMY

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ABSTRACT

The affinity diagram, which is regarded as one of the seven 'new' management tools, is used to gather a large amount of subjective data concerning an issue and subsequently classify them into several groups. The ideas (or factors) which are similar in nature or have 'affinity' among themselves are placed in a particular group. The procedure of constructing an affinity diagram is to state the issue, brainstorm to collect ideas, sort the ideas into logical groups, develop concise headings for each group and prioritize the ideas belonging to the groups. In the existing literature on affinity diagram, no systematic approach has yet been applied to prioritize the ideas belonging to a group. This paper applies the Analytic Hierarchy Process (AHP), a popular multiple criteria decision making tool, to prioritize the ideas. To show the validity of the proposed improvement to the affinity diagram, the issue of the Malaysian K-economy has been considered as an example. In the brainstorming exercise, 5 academic staff, 2 administrative staff and 6 Masters students take part. In the first phase of the exercise, altogether 49 factors are generated. They are categorized by means of an affinity diagram and subsequently, using the AHP, priorities of the items belonging to each category or group are established. This prioritization process isolates the most important factors (pertaining to the issue) in each group. A list comprising the most important factors has been formed by taking the factors of higher priorities from each group. In the second phase of the study, again using the AHP, priorities of the important factors in the list are established. A brief description of the 10 higher ranked factors in the list are provided. The inner strength of the proposed modified

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affinity diagram is its capability to identify the most important factor(s) behind the issue under investigation. In the organizational context, the diagram can help managers focus on the key factors pertaining to an issue.

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1. INTRODUCTION

Total Quality Management (TQM) is gaining its applicability in a rapid way. With stiff competition in business, diminishing resources, increasing customer demands and to sustain in the era of globalization, national/multinational companies do not have any other choice but to improve the quality of their products or services. TQM researchers have developed 7 tools to improve quality and productivity. These are the histogram, check sheet, Pareto diagram, run chart, control chart, cause and effect diagram and scatter diagram. They are also known as the 7 basic management tools (Evans and Lindsay, 2002). The distinguishing feature of these tools (except the cause and effect diagram) is that they use numerical data as inputs. However, in many practical problems, we do not have numerical data, rather, only subjective ones. Consider the problems: What will be the vision or the strategic direction of an organization? How to manage a new project? How to develop a new product or service? Usually, meetings are convened to discuss this type of issue. But many a time, we have the experience that these meetings drag on hour after hour and even meeting after meeting. Furthermore, these meetings are invariably dominated by a few individuals and they try to impose their own opinions upon the majority (Finlay, 1992; Delbecq, Van de Ven and Gustafson, 1975). Or worse yet, no consensus is reached, so the status quo is the outcome by default.

In view of this, we need a new toolkit. Management scientists have developed another set of 7 tools, namely, the affinity diagram, relational diagram (also called the interrelationship diagram), matrix diagram, tree diagram, matrix data analysis, process decision program chart and activity network diagram (also known as the precedence diagram or arrow diagram) (Nayatani et al., 1994; Besterfield et al., 2003; Sandras, 1996). These tools can handle subjective data effectively.

Basically, these 7 new management tools have been developed due to the inadequacy of the previously stated 7 basic tools. The affinity diagram, which is the main topic of this paper, is one of the most prominent and widely used among the 7 new tools. In the following, a brief description of the affinity diagram is provided.

2. A BRIEF DESCRIPTION OF THE AFFINITY DIAGRAM

The affinity diagram developed by Kawakita Jiro, a Japanese anthropologist, is used to gather large amounts of verbal data (ideas, opinions, etc.) related to some specific issue and organize them into groups based on the natural relationship among themselves. Jiro uses this tool, also known as the KJ method named after him, to assemble qualitative sociological data. TQM practitioners noted the similarity between his problem and many of the problems encountered in business and subsequently adopted the tool. Since the mid 1970s, Japanese executives have found the affinity diagram very useful in strategic planning. In fact, in Japan, the affinity diagram has been the most widely used tool in performing strategic planning. The tool was introduced to the US by Michael Brassard in 1989 (Brassard, 1989).

The main purpose of using an affinity diagram is to allow managers or a team of problem solvers to sift through large volumes of subjective information efficiently and identify natural patterns or groupings in the information. With the affinity diagram, managers can more easily focus on the key issues and their elements rather than an unorganized collection of data. Mizuno (1988), a noted quality expert, states that an affinity diagram clarifies important but unresolved issues through the collection of verbal and subjective data from disordered and confused circumstances and subsequent analysis of the data on the basis of mutual affinity.

2.1 WHEN TO USE THE TECHNIQUE

The affinity diagram can be used in the following situations:

- i. When the issue considered is so complex and known facts are so disorganized that people cannot make use of them.
- ii. When it is necessary to shake up thought processes and get rid of

traditional ways of thinking, especially ideas which are not working well (Goetsch and Davis, 2003).

- iii. When it is important to build a consensus for a proposed solution.
- iv. When everything seems chaotic.
- v. When a breakthrough is needed.
- vi. When participation and support for a solution are essential.
- vii. To expand team's thinking, encourage, motivate, and invigorate stagnating groups.
- viii. When it is necessary to establish a quality council policy concerning new projects, new products or new technology.

In short, the technique can be used when there is a need to convert a large volume of subjective ideas relating to any issue into manageable, logically related groups (Kelly, 2000). Bossert (1991) wrote,

“The biggest obstacle to planning for improvement is past success or failure. It is assumed that what worked or failed in the past will continue to do so in the future. We therefore perpetuate patterns of thinking that may or may not be appropriate. Continuous improvement requires that new logical patterns be explored at all times” (p. 52).

This is where the affinity diagram can be useful. The affinity diagram breaks old patterns of thought, reveals new patterns and generates more creative ways of thinking. In particular, an affinity diagram can be useful in the following situations: (i) to develop a vision statement of an organization; (ii) to identify possible factors pertaining to an issue; (iii) to identify the possible causes of a problem; (iv) to generate possible solutions to a problem; (v) to solve various quality related problems; and (vi) to generate strategies for market survey.

2.2 HOW TO USE THE TECHNIQUE

The affinity diagram requires a group of people to be assembled in a meeting room. There is no consensus about the size of the group. However, in the experience of the practitioners, the technique best works when there are 8 to 12 people in a group. In any case, it is not advised to incorporate more than 15 or less than 5 people in the group.

The most effective group is one whose members have the needed knowledge to uncover the various dimensions of the issue considered and they are willing to contribute to the group inputs.

Having formed the team, it is necessary to perform the following steps:

Step 1: Articulating the Question

The facilitator of the group should pose the question concerning the issue in a clear-cut manner so that everybody can understand it. The question should be as stimulating as possible. It is often best to state the question in terms of weakness (Rao et al., 1996). For example, "What are the weaknesses in our accounts payable unit?" The facilitator should refrain from giving details about the issue, because too much detail can inhibit creative thinking.

Step 2: Brainstorming to Generate Ideas

Each of the participants is required to generate 5 to 10 ideas silently. These are written down on 3" x 5" Post-it notes. The ideas should be as brief as possible while still having a clear meaning. Ideally, each idea should not exceed 7 words. One idea should be written on one Post-it note.

Step 3: Posting and Scrubbing Ideas

The facilitator collects the notes from all the participants one by one, reads them aloud and posts them on the wall or on a large flip chart. Duplicated ideas are omitted. At this stage, there should not be any criticism of any idea. However, if the meaning of a certain idea is not clear, then it has to be made clear. In the literature, this is known as scrubbing. It is to be noted that the notes are posted on the wall in a purely random manner.

Step 4: Grouping the Ideas

The key to an affinity diagram construction is the silent sorting of the ideas into related groups. The participants are asked to form groups of similar ideas in the following manner:

- i. Start by looking for 2 ideas that seem related or have affinity between them and put them in a group.
- ii. Look for ideas that are related to those already set aside and add

them to that group.

- iii. Look for other ideas that are related to each other and establish new groups.

No reason needs to be given to justify the grouping. If there is any disagreement in grouping, then re-sorting can be done until the team is satisfied with the grouping. Further, stand-alone ideas, which do not fit into any group, can be put under the “Other” category.

Step 5: Creating Headers

The participants need to develop a phrase consisting of 3 to 5 words, which represents the central meaning of a group. This should be written on a card and placed at the top of the group. This card will be treated as the header for that group. Headers should be developed for all the groups. It should be simple enough and clear even to a visitor to that room. When all the headers are created, we get an affinity diagram.

Step 6: Prioritizing Ideas in a Group

Usually, voting is adopted to prioritize the ideas belonging to a group and for drawing conclusions. A detailed analysis of this step is given in Section 3.

2.3 TIPS FOR CONSTRUCTING AN AFFINITY DIAGRAM

The following tips are helpful in constructing an affinity diagram:

- i. Form a team of 8 to 12 people.
- ii. Make sure that the team members are knowledgeable about the issue to be discussed.
In Steps 2 and 3 above, apply brainstorming rules, e.g., the larger the number of ideas, the better, and no criticism of any idea.
- iii. Before forming groups as in Step 4, make sure that all the ideas are clear to everyone.
- iv. If a group of ideas becomes very large (say, more than 10 ideas), split it.
- v. If possible, have the groupings reviewed by non-team personnel.
- vi. If an idea fits into more than one group and consensus about its

placement cannot be reached, make a second card and place it in both groups.

Though voting is applied to prioritize the ideas, there is no unique pattern of votes. In the following section, we present a new systematic prioritization procedure.

3. PROPOSITION OF A NEW PRIORITIZATION PROCEDURE

In the existing literature on the affinity diagram, there is no consensus on the adopted technique to prioritize the ideas belonging to a group. This paper proposes and attempts to validate the use of the Analytic Hierarchy Process (AHP) to prioritize the ideas. It is to be noted that the main objective of the paper is to propose a new prioritization procedure using the AHP for identifying the superior ideas from an affinity diagram. Since its development in 1977, the AHP has been successfully used in prioritizing criteria, factors, scenarios, or alternatives in numerous situations (Islam, 2003). We view that the AHP is well-suited to prioritize ideas in an affinity diagram. The affinity diagram is expected to enhance its usefulness with the integration of the AHP. A detailed description of the proposed procedure through a practical example is given as follows.

The example that is considered for the exercise is based upon the Malaysian knowledge economy. Malaysia aspires to be a fully developed country by the year 2020. In the course of achieving this vision, there are many challenges to be resolved. One of the challenges is that the country's economy will be based upon knowledge. The country has to make a paradigm shift from its present production-based economy (P-economy) to a knowledge-based economy (K-economy).

The term knowledge economy was first coined by Dr. Peter Drucker, a noted management guru in the 1960s. According to him, "It (knowledge) is now fast becoming one factor of production, sidelining both capital and labor."¹ In short, K-economy is defined as an economy that primarily relies on the use of ideas rather than physical abilities, on the application of technology rather than the transformation of raw materials or the exploitation of cheap labor. In Malaysia, the movement

for a K-economy has been gaining momentum. The first workshop on the K-economy was held at Bank Negara Malaysia in April, 1999 and addressed the questions of “where we are?”, “where we want to be?” and “how do we get there?” The government has also launched the K-Economy Master Plan of which the major objective is to ensure the optimal and increasing application of knowledge in the production processes in all sectors of the Malaysian economy. Though the topic is not new, nevertheless, the main objective of our brainstorming session was to address the question, “How to get there?”, that is, to identify the critical factors to be considered seriously in order to develop the K-economy.

Thirteen people participated in the session. The composition of the group is as follows: 5 academic staff (2 professors, 1 associate professor and 2 lecturers), two administrative staff (departmental secretary level) and six Masters students. All of them agreed to contribute to the topic chosen. The details of the session are as follows:

Step 1: Articulating the Question

As the facilitator of the session, I (the author) posed the question, “What are the factors to be considered seriously in order to develop the Malaysian economy based upon knowledge?”

Step 2: Brainstorm to Generate Ideas

Each of the 13 participants was asked to generate as many factors as possible and to write them down on the supplied *Post-It* notes. Ten minutes were allocated to generate the factors.

Step 3: Posting and Scrubbing the Ideas

From one end of the room, I started collecting the notes and posted them on the flip chart. Duplications were omitted and altogether 49 factors were identified. These are shown in Table 1 (see Appendix A). In the scrubbing phase, the following factors were clarified:

- Replicating the system in countries using the K-economy
- Identifying cultural sensitivity
- Balancing top-down and bottom-up approaches
- Removing emotional objectives and cognitive blindness

- Flexibility to cope with dynamic changes
- Enhancing coping with rapid changes

Steps 4 & 5: Grouping the Ideas and Creating Headers

After considerable deliberation, we were able to reach a consensus decision in forming the groups of factors. Suitable headers for each group were also developed upon mutual discussion. At that moment, the affinity diagram was completed and is shown in Figure 1 (see Appendix B).

Step 6: Prioritizing Ideas in a Group

Obtaining the groups of factors pertaining to the issue is not sufficient. We need to know the most important factor(s) in the group. This necessitates prioritization of the factors. Here we propose to use the AHP (Saaty, 1990; Saaty, 2001) to do the same. In a related problem, the AHP has been applied for prioritizing ideas derived by using the nominal group technique (Islam, 2002). A few recent interesting applications of the AHP can be found in Kim and Min (2004), Bahurmoz (2003), and Liang (2003). A brief account of the AHP has been provided in the Appendix C. Details of the proposed prioritization procedure are provided below.

All the participants were given an explanation about the working of the AHP, particularly the (1/9-9) ratio scale. They formed pairwise comparison matrices for all the groups individually. The average time taken to form all the pairwise comparison matrices was about 50 minutes. The set of 10 matrices (because there are 10 groups of factors as shown in the affinity diagram) for one participant is shown in Table 2 (see Appendix A).

All the participants were requested to submit their pairwise comparison matrices. Since there were 13 participants, 13 judgments were available for each and every pairwise comparison. To reach this stage, we spent about 90 minutes. After this, the participants dispersed because of their other commitments. The other reason for dispersion of the session was that the meeting room was not equipped with a computer with the necessary Expert Choice software (required to derive weights from the AHP pairwise comparison matrices). After collecting all the 13 sets of pairwise composition matrices, the facilitator individually

synthesized entries for every cell by using the ‘geometric mean rule’ (Basak and Saaty, 1993). The synthesized matrix is shown in Table 3 (Appendix A).

We have several observations on filling the matrices. Some participants are observed to use very high ratings (e.g., 7 or 8 in the (1/9, 9) ratio scale) to fill most of the entries in all the matrices, whereas some others prefer to use only lower level ratings (say, 2 or 3) for most of the entries. In both cases, the range of the rating used is small. Further investigation can be made to generalize the observation, i.e., whether or not the respondents are biased in using the AHP (1/9, 9) scale. As a second observation, we have noted that the AHP respondents range from being very consistent in providing judgements to being highly inconsistent. All the participants’ inconsistency ratios (IR) for all the pairwise comparison matrices are shown in Table 4 (see Appendix A). In the AHP, matrices having IR less than 0.10 are acceptable, and we found that the majority (54 out of 91 matrices, 59%) of the matrices are inconsistent. Further, the matrix becomes more inconsistent as it grows its size (vide columns corresponding to PCM 1 and PCM 2 in Table 4).

Further, it is important to note that the individuals have widely different opinions regarding the importance level of the K-economy factors. A compilation has been done for every entry of all the PCMs and the minimum as well as maximum ratios are obtained. Considering the minimum and maximum ratios for every entry, we obtain the interval PCM for all the factors of the K-economy, as shown in Table 5 of Appendix A.

The matrices clearly show that there exists a significant difference in the weights proposed by the respondents.

Using Expert Choice (Forman, 2000), the weights of all the factors belonging to each group were computed. The factors that receive higher weights in the group are chosen in the final list of important factors. The facilitator, in consultation with two of the participants of a previously concluded session, came up with the list of 15 seemingly more important factors (taking 3 from group 1, 3 from group 2, 2 from group 3, 1 from group 4, 2 from group 5, 2 from group 6, and 2 from group 3; none from groups 7, 8, and 10 because of their perceived less importance compared to the factors already chosen in the list). The list of important factors is shown in the second column of Table 6 (see Appendix A).

To perceive the relative importance of the 15 factors, once again, all the participants were contacted individually to form pairwise comparison matrices (in fact, in this second phase of the study, there is only one pairwise comparison matrix of size 15×15 for the 15 factors). One participant's PCM and synthesized PCM are shown in Appendix A in Tables 7 and 8, respectively. Observations in this second phase of data collection are also the same as the first phase (the brainstorming session). In particular, the minimum and maximum IR for the matrices obtained from all the respondents are 0.06 and 0.51, respectively. On the average, the respondents took about 20 minutes to fill the sole PCM.

The weights of the 15 factors in the synthesized PCM in Table 8 are computed (using Expert Choice) and their rankings are provided in the last two columns of Table 6.

In the following discussion, a brief description of the 10 higher ranked factors is provided.

i. Bridging the gap between existing and required knowledge

No country's economy is developed based upon the contributions of only a few individuals. That is, it is the responsibility of the entire population of the country to contribute to its economy. Many people view that the Malaysian economy is still in the state of a P-economy. All out efforts should be made by the government to close the gap between the required knowledge and the existing knowledge in order to migrate to a K-economy. A structured 'knowledge needs analysis' is expected to help identify the knowledge gap between existing knowledge and the knowledge needed to achieve the state of the K-economy. Upon identifying the knowledge needed, an intensive activity to acquire it is the next agendum. In fact, the Malaysian government has taken a number of important steps to bridging the gap, such as the setting up of the National Information Technology Agenda (NITA), the Multimedia Super Corridor (MSC), and the K-Economy Master Plan. However, there is more to be done before it can move successfully into a K-economy.

ii. Generating an intelligent and knowledgeable workforce

The key issue for a successful achievement of a K-economy is an

adequate supply of knowledge workers. Knowledge workers are workers who have the following characteristics:

- Possess analytical skills
- Use technology to gather data, analyze information and articulate knowledge
- Able to cope with rapid and unexpected changes
- Benchmark their work against the best practices
- Use “their heads more than their hands”

Traditionally, people think that it is the land, capital, and natural resources that constitute a country’s economy. However, we must not forget that in the modern era in which we are living, it is not natural resources but human resources which are more important. One may look at Microsoft Corporation, of which the source of its huge wealth is the ingenuity of its engineers. The essential requirement of a K-economy is generating an intelligent and knowledgeable workforce. For Malaysia, the educational system needs to be revamped and restructured in order to enlarge the pool of knowledge workers. The focus should be on how to make the existing curriculum more innovative to help children invent and develop a critical and analytical mode of thinking, and ultimately create a sufficient pool of well-educated, highly-skilled and strongly-motivated workers.

Dr. Noordin Sopiee, Head of Malaysia’s Knowledge-Economy Master Plan once said (cited in Khaw and Leong, 2001), “In the year ahead, we must make sure that every factor of production not only works harder, move importantly, every factor of production must make sure that we put more K (Knowledge) into the P (Production)” (p. 23).

iii. Providing better infrastructure (including IT) and facilities

One cannot develop knowledge without having the proper infrastructure and facilities. A country’s IT infrastructure is especially crucial for the success of a K-economy. Unless a country is adequately equipped with proper infrastructure (including ICT), it cannot take advantage of the new K-economy.

iv. Enhancing creativity and innovation

Migration from the industrial era to the knowledge era requires that we intensify the knowledge content in all activities of the economy. Knowledge workers need to develop new and better methods, and techniques to do things in better ways. Unless people become creative and innovative, they cannot develop new techniques. In fact, creative and innovative minds are the essence of knowledge workers. It is the innovative and creative minds of the scientists, engineers, technologists which have paved the way of progress and prosperity of the whole world.

The present factor was also well recognized by the former Prime Minister of Malaysia, Tun Dr. Mahathir Mohammad when he said (cited in Khaw and Leong, 2001),

“In pursuit of information, knowledge and wisdom, we must be prepared to face reality. We must embrace change, pursue novelty, and crave innovation. We must learn. Even harder still, we must unlearn. We must remember to forget old days. We must force ourselves into new habits. We must build new processes, institutions and organizations that are necessary for the information age” (p. 23).

Wealth creation depends on our ability to leverage creativity and imagination. According to the September 1999 issue of the Fortune magazine, the ten richest persons in the US under the age of 40 created their enormous wealth over a short time by leveraging their creativity over the Internet. A culture of innovation and creativity is the essential pre-requisite for the creation of new knowledge.

v. Creating a continuous learning environment

The world is changing every day. If we stop learning, then very soon we will lag behind the whole world. The basic premise of a K-economy is to create wealth by utilizing talents and also learning from others. To do this, the creation of continuous learning environment is a must. According to *The World Competitiveness Yearbook* (2001), Malaysia

was the 18th most competitive major economy in the world in 1994, but fell to 29th in 2001. This simple statistics show that to stay in the competitive world, we must strive to improve the system of production and service continuously. Creating a culture of continuous learning and openness to new ideas is critical for a knowledge-based economy. This is not only limited to learning on the job, but to learning in multiple environments: at home, at school and at work through a structured continuing education.

Yong (2003) writes, "A continuous learning attitude is essential to ensure you stay ahead. Knowledge needed must be current and specific. The change in today's economy require the K-professional to keep abreast with what is happening around him and he is one who will continuously seek for better ways of doing things" (p. 2). In the online interview with *The Star* (April 25, 2001), Tengku Azzman Shariffadeen, the CEO and President of Mimos Bhd., mentioned, "In the K-environment, learning is for life. It does not stop with a diploma or degree."

vi. Ensuring wider applicability of technology

If we look at the economies of the developed nations in the world, it will be clear to us that the critical success factor for these economies is the wide-scale application of technology. Most of the developing countries are lagging behind in this regard. In Malaysia, it is widely accepted that gradually the country should cease her dependence on foreign workers. Much of the things in various types of industries have to be automated. All avenues have to be identified where technology can be applied and it is expected that this will expedite the process of achieving the vision of a K-economy.

vii. Providing skills to apply knowledge in practice

In Finland (which is in the process of developing its K-economy), the emphasis has been placed on technical education which can be applied in business and industrial sectors and thus productivity and quality can be improved. Further, Table 9 in Appendix A shows that, compared to many developed nations, Malaysia is well short in generating professional and technical workers.

Focus should be in place to impart the kind of education and knowledge that can be practicable. Tengku Azzman Shariffadeen says that the ability to apply the acquired knowledge in the actual working environment is the key success factor in the K-economy (*The Star*, April 25, 2001).

viii. Enhancing dedication and motivation

Motivation is an essential ingredient for any employee to work harder and smarter. In an organizational setting, careful planning should be in place to identify the motivators of individuals, because motivators vary from person to person. It is motivation that make individuals dedicated in their work.

ix. Evaluating and appreciating feedback

Feedback helps to identify the weaknesses in a system. Feedback (in a variety of forms like comments, suggestions, constructive criticism, etc.) should be sought for in a continuous basis from employees in order to know whether or not the requirements of the employee and also the organization are met. Every organization should consider new and innovative ideas for the further development or improvement of its products or services as assets.

x. Encouraging collaboration among various sectors in the K-economy

As stated before, developing a country's K-economy is everybody's responsibility. The government's efforts must be supplemented by the private sector. On the other hand, the government should also ensure that the private sector operates in a congenial atmosphere. When there is collaboration among various sectors, everyone wins. In particular, collaboration is an important necessity for the purpose of cross-fertilization of ideas and to generate newer initiatives. Wan Latifah (1999) maintains, "K-economy is very much networked, hence, planning of programs and implementing them should be made in a cooperative and collaborative manner" (p. 27).

The working procedure of the proposed modified affinity diagram method has been shown by means of the holistic example of the K-

economy. The method can be further applied to identify and prioritize 'actionable' tasks pertaining to many factors of a K-economy. Some of these are:

- What are the specific activities to be undertaken in order to bridge the gap between the existing and required knowledge?
- What specific infrastructure (including IT) and facilities need to be provided?
- What are the specific ways to promote creativity and innovation?
- What are the specific skills needed and how can these skills be provided so that they can be applied in practiced?
- What are the specific ways to collaborate among the various sectors in the K-economy?

4. K-ECONOMY FACTORS FROM OTHER RESEARCH

Substantial work has been carried out on various aspects of the Malaysian K-economy. A sizable percentage of these works pertains to identifying the factors for the realization of the K-economy. Ali (2002) recognizes the importance of creative society and improvement of society's ICT literacy rate for economic growth and sustainable development. He also advises the management of various Malaysian organizations to be more concerned about production efficiency, workers' productivity, dynamism, creativity, positive work ethics, socially responsible management, and changing functional work culture to teamwork and networking. Regarding the importance of knowledge workers he writes, "Malaysian workers not only need to acquire skills and knowledge but the workers also need to be instilled with correct work attitude and ethics. A disciplined, efficient and skillful workforce will no doubt, lead to increased productivity and ensure that our economic development is both resilient and sustainable in the long term" (pp. 14-15). He outlines the intended behavior of the Malaysian workforce as the following: thinker, entrepreneur, adapter, learner, creator, innovator, knowledgeable, skillful, respected, productive management and business competent, instrumentalist, scientist, technologist, ethical and socially responsible.

Ahmad (2002) argues that the K-economy can be achieved only if the population is transformed into a knowledge society. Institute of

Strategic and International Studies director-general, Datuk Mohamed Jawhar Hassan emphasizes on securing the necessary human resources because the K-economy is an economy based on knowledge and knowledge resides in human. He further suggests that Malaysia should expedite to execute the plan for developing a world-class education system. Seetharaman, Zaini Sooria and Saravanan (2002) report that in a K-economy, knowledge or intellectual capital as an economy wealth production factor takes precedence over physical assets. To expedite the process of achieving a K-economy status, they advocate more investment in IT, e-commerce, software, research and innovation, global customer base, and worldwide network.

Public and private business organizations have significant roles in shaping the country's K-economy. Yong (2003) recommends the Malaysian organizations to embark upon the following knowledge management activities:

- i. Identifying knowledge (to bridge the gap between existing knowledge and the knowledge needed to achieve the desired objectives)
- ii. Acquiring knowledge
- iii. Applying knowledge
- iv. Sharing knowledge
- v. Developing knowledge
- vi. Creating new knowledge
- vii. Preserving knowledge
- viii. Measuring knowledge

According to Tengku Azzman Shariffadeen, the CEO and the president of Mimos Bhd., the ability to learn, think, and apply knowledge in shared working environments is the key success factor in the K-economy. His advice to the Malaysian students is to have sound knowledge about a particular discipline and to have the skills to apply that knowledge (*The Star*, April 25, 2001).

To realize the vision of the K-economy, Khaw and Leong (2001) recommend to the Malaysian government to:

- i. foster a culture of innovation by increasing private R&D spending, promote a spirit of creativity in organizations;

- ii. relax immigration policies, in anticipation of greater competition for knowledge workers, especially among knowledge-based economies; and
- iii. promote new businesses through industry clusters, similar to what is done in the US Silicon valley

The requirements for a K-economy are that all government agencies and private firms should develop and implement strategies to migrate to the K-economy and to attract foreign K-businesses and K-workers. In addition, more and larger investments in R&D in all sectors need to be created, apart from setting up a world-class technical university to produce high-level K-skills in order to shift the skew to engineering, science, and technology and other K-skills and to realign educational content and delivery at all levels (Wan Latifah, 1999).

5. CONCLUSION

Making groups of ideas (or factors) and subsequently creating headers for them is not enough in an affinity diagram. We need to know the most important ideas concerning the issue under investigation. This requires the prioritization of the ideas belonging to the groups. In the existing literature, there are no clear-cut guidelines in this regard. This paper proposes to prioritize the ideas by using the AHP. This proposed prioritization procedure is meant to bring the major factors to be resolved pertaining to the issue to the surface. The major advantage of using the AHP in the new prioritization procedure is that the participants get the opportunity to compare the ideas in a pairwise fashion; thereby increase the accuracy in the ranking of the ideas. In the organizational context, managers need to identify problems faced by the organization and solve them to check further deterioration of performance. The inner strength of the proposed modified affinity diagram is its capability to identify the most important factor(s) behind the issue under investigation in a systematic manner.

Finally, it needs to be stressed that in this paper the example of the K-economy has been chosen to show the working and validity of the proposed modified affinity diagram. As per the rules of construction of the affinity diagram, only 13 individuals were chosen in the brainstorming session. To increase the reliability in the findings, especially pertaining

to the K-economy, a larger sample should be chosen and a much wider survey should be conducted. The proposed method is more applicable to an organizational setting where the manager desires to find out critical issues to be resolved in the organization by involving a number of 8 to 12 employees.

ENDNOTES

1. As quoted in Khaw and Leong, 2000, p. 22.

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