

Cognitive Limitations and Decision Making

3

By: Anis Chariri

It is widely known that judgment is an inevitable aspect of living for both individuals and organisations. Judgments involve information acquisition and processing that are required in helping individuals make a decision. Individual's ability to search for and process information will eventually determine the accuracy of judgments and decisions made. Unfortunately, individuals, as human beings, have cognitive limitations in searching for and processing information. As a result, they can make an inaccurate judgment. As Hogarth (1980) argues, although individuals are adaptive, they have limited information processing capacities. This paper discusses cognitive limitations of individuals in obtaining and processing information, the potential impact of the limitations on making decisions, and possibilities to overcome the limitations.

Cognitive Limitations¹⁾

THE main cognitive limitation of individuals in searching for information is inability of individuals to obtain comprehensive information due to the fact that people have a limited memory capacity. Hogarth (1980) believes that individual's perception toward information is "selective". Individuals tend to gather and process infor-

mation available and ignore other relevant information that has not been available at the time they are making a judgment. It is also believed that "people tend to focus on, or recall on the occasions when events occur together, thereby forgetting instances when there was no occurrence" (Goodwin and Wright, 1993: p. 154). An empirical evidence also shows that individuals find it difficult to choose information. For example, research conducted by Abdel-Khalik and El-Sheshai (1980) showed that

²⁾ Much of discussion on this section is based on Hogarth's reviews (1980)

information choice was the main reason for the inferior prediction achievement.

The second cognitive limitation is that individuals tend to obtain information which supports their own opinions. Indeed, they are reluctant to search for information that contradicts with their hypothesis. It is no wonder if individuals do not want to obtain contradicting evidence (Hogarth, 1980). Empirical research finding shows that when an individual is asked to test hypothesis, he or she tends to seek the confirmation of the hypothesis (see for example: Einhorn and Hogarth, 1978).

Furthermore, because of their selective perception toward information,

to believe specific information that can be easily recalled from memory or their experience.

Individuals also have limitations in searching for information in regard to the kind of information. They prefer to obtain concrete information, that is based on their own experience, than abstract information such as statistical data. Hogarth (1980: p. 161) claims that "data coded in memory by image and through several associations can become disproportionately salient". Accordingly, individuals often ignore base rate (prior) information which is produced by relevant sources. In fact, "the amount of information searched decreases with increasing amount of prior information" (Kozlowski and Ford, 1991: p. 291).

In relation to information processing, individuals also have cognitive limitations. The main cognitive limitation of individuals in processing information in inability of individuals to combine different sources of information due to the fact that human lack knowledge and computational skills. Information obtained from

individuals tend to search for information that in much easier to obtain. One interesting example of this is an experiment conducted by Tversky and Kahneman (1974). They argue that if an individual is asked the following question: in the English language are there more words that start with an 'R' or for which 'R' is the third word?, he or she tends to believe that the words which start with an 'R' is more likely. However, as Tversky and Kahneman point out, the fact shows that 'R' is more frequent as the third letter. The example indicates that individuals tend to search for information that is easier to obtain. They tend

memory and environment has different meanings and individuals have different preference toward the information. Thus, they must be bale to select information and the combine it properly to make accurate judgments. However, because individuals cannot combine a lot of information simultaneously, it is believed that information processing is mainly done in sequential manner (Hogarth, 1980). This is supported by research conducted by Abdel-Khalik and El-Sheshai (1980) which showed that humans find it difficult to combine information.

Moreover, it is evident that multiple sources of information have differ-



ANIES CHARIRI

Finished Economic faculty for S1 in 1991 from UGM and achieved his Master of Commerce in Accounting from The University of New South, Wales, Sidney, Australia, 1996

ent degree of independence on each other (Hogarth, 1980). This makes it difficult for individuals to combine information. Some evidence also shows that individuals are sensitive to the reliability of data sources. For example, Hogarth (1980) points out that individuals seem to treat data sources as though they were perfectly reliable. Inability to combine and integrate information causes individuals simplify their judgment processes. It is true that to some extent the simplification is beneficial in helping individual make judgments. However, it can lead to biases that will eventually influence the accuracy of judgments made.

Impacts of The Limitations

As mentioned above, cognitive limitation of individuals in seeking and processing information can cause individuals make inaccurate judgments. If this is linked to decision making process, it can be argued that in line with such limitations, decisions made by individuals can be inaccurate because decision making process also involve judgments. In fact, judgments are cognitive aspects of decision making process (Bazerman, 1990).

To analyse the potential impact of human's cognitive limitations on decision making process, it needs to understand the rational-decision making process, especially its components. This is because in making decisions that optimise their objectives, as Simon claims, individuals are limited by bounded rationality (quoted by Hogarth, 1980). In general components of decision making process are setting objectives, defining problems, identifying alterna-

tives, identifying expected outcomes resulted from each alternative and computing the optimal decisions.

It can be argued that in making decisions, it needs to search for and processing relevant information. Abilities to obtain and process information will influence the accuracy of how problems are set, alternatives are identified and finally decisions are made. Because the quality of decision making, to some extent, is dependent on the abilities of individuals to obtain and process information. The limited capacities, indeed, could result in systematic biases (Tversky and Kahneman, 1974).

Tversky and Kahneman continue to argue that in making decisions, individuals tend to rely on a number of simplifying strategies (heuristic or rule of thumb). Such simplification usually enables individuals to reduce the information demand. Northcraft and Neale (1990) claim that the simplification help decision makers summarise past experience and provides an easy method to evaluate the present. It also substitutes simple rules of thumb for complex information collection and save considerable mental activities and cognitive processing. It seems that heuristic is helpful for individual in making a decision. However, if individuals do not recognise the potential danger of using heuristic in making decisions, they might make a wrong decision.

There are three general heuristic biases that can help to explain how individuals deviate from the rational decision making process.³ The first heuristic bias come from availability heuristic. The

³ For complete review see Tversky A., and D. Kahneman, (1974), "Judgment Under Heuristic: Heuristic and Biases", *Science*, Vol. 185, pp. 39-61.

heuristic refers to individual's tendency to assess the frequency, probabilities or likelihood of an event occurring by how readily individuals can remember it (Tversky and Kahneman, 1974). Individuals tend to assess an event that is 'vivid', easily imagined and specific. This heuristic to some extent might be useful for decision makers because it can help them make a judgment that is needed to make a decision. However, this heuristic can result in errors or biases when ease of recall is influenced by other factors which are not related to the frequency of an event's occurrence (Bazerman, 1990). Consequently, when individuals respond a problem by using availability heuristic quickly, they might ignore less available information that is actually more useful and appropriate for making a decision. This could lead to a wrong decision.

The second heuristic is representativeness. According to Tversky and Kahneman (1974), this heuristic refers to individual's tendency to assess the probabilities of an event's occurrence to stereotypes of similar occurrence. For example, a manager might use this heuristic when he predicts the success of new products based on the similarity of that products to the past successful or unsuccessful product types. The decision made to the new product might be appropriate and the new product will be successful as the old products. Nevertheless, it could happen that the new product will be unsuccessful. This is because the success or failure of the old products is not representative of success of the new ones.

The example shows that although representativeness heuristic can be beneficial in helping individuals make decisions, it also often leads to biases or

errors. The reason is that under such heuristic, individuals tend to ignore base rate (prior) information in assessing the probabilities of events when any other relevant information is available but individuals do not recognise it. In addition, they tend not to take into account the role of sample size in valuing the reliability of sample information. This, of course, can make decision makers reluctant to search for new information which enables them to make a better decision.

The third heuristic is anchoring and adjustment. Under this heuristic, individuals make judgment by starting from an initial value and then adjust it to make final judgments. To some extent, this heuristic is probably useful for individuals in making decisions. In fact, it is much easier to start from somewhere than start from nowhere (Bazerman, 1990). However, the use of anchoring and adjustment can result in a wrong decision. It is clear that although individuals have abilities to make adjustment based on the initial value, they can perform insufficient adjustment. As a result, decisions that they make by using this heuristic can be wrong or inaccurate. Furthermore, under this heuristic individuals tend to be overconfidence when they make a difficult decision (Bazerman, 1990).

Due to the fact that cognitive limitations can result in a wrong decision, it remains an issue: how can the cognitive limitations be overcome so that individuals can make an accurate decision?

Possibilities to Overcome The Limitations
In line with the limitations and its potential impact on decision making process, it is claimed that the main key to overcome the limitations is that individu-

als must be able to recognise that they have cognitive limitations in searching for and processing information. Without such recognition, it is impossible to overcome problems associated with the limitations. A number of strategies can be used to overcome the problems.

Firstly, individuals can use decisions aid in making decisions. By doing so, they can structure their problems properly, and then assess each consequent of course of action accurately (Hogarth, 1980). Hogarth also argues that decisions aid enables individuals to assess uncertainties, evaluate alternatives, conduct sensitivity analysis, gather information properly, and then make a choice. Consequently, by applying decisions aid, it is possible for individuals to process information that they obtain from memory and environment accurately. In fact, as Kozlowski and Ford (1990) found from their empirical studies, cognitive information processing model is generally characterised by 4 key rating processes: 1) observation, attention, and information acquisition; 2) encoding and storage in memory; 3) retrieval or recall; and 4) rating or judgments. Thus, decisions aid enables individuals to improve their cognitive information processing in order to help them make an accurate decision. Based on his research, Polister (1991) suggests, in making decisions, decisions aid can outperform intuitive analysis. Moreover, it is believed that abilities to identify a problem and its causes can

help decision makers avoid a wrong decision (Dukerich and Nichols, 1991). This is likely to be achieved by using varieties of decisions aid.

There are a number of decisions aid that can be used to help individuals overcome their cognitive limitations especially

There are a number of decisions aid that can be used to help individuals overcome their cognitive limitations especially in processing information

in processing information. One of that is the use of linear model such as standard regression analysis and discriminate function analysis. Hogarth (1980) believes that the use of linear model analysis enables individuals to combine or integrate information in a consistent manner. Consequently, the use of the model can hopefully help individuals make an accurate decision.

However, to some extent, the model has also limitations. Dawes (1979) argues that although linear model can integrate information in an optimal manner, it is always individuals who choose information (variables). Indeed, Dawes claims that the model cannot replace 'expert' in choosing 'what to look for'. As a result, individuals cannot construct statistical model if there is inadequate sample size and measurable criterion variables are unavailable.

What Dawes argues is probably true that the linear model has potential weaknesses. Nevertheless, it can be claimed that the model is still useful in helping individuals make a decision. The most important thing here is not whether the model has weaknesses or not, but how individuals utilise the model to help

them improve their ways of making decisions in accordance with their problems and conditions underlying the problems. As Hogarth (1980: p. 156) suggests, 'technology can be adopted to complement human judgments rather than expose its weaknesses'.

Secondly, to overcome the above limitations, individuals can learn from their experience. The reason is that judgment are part of human living. Thus, by learning from their experience, it is possible that individuals can improve their ways of making judgment or decisions, especially in searching for and processing information. Kagel and Levin (as quoted by Bazerman, 1990) have argued that individuals will improve their decisions by learning from feedback about past decisions. Consequently, learning from experience enables individuals to acquire better ideas of how to make rational decisions and how to avoid biases.

Although some researchers believe that individual can learn from experiences to improve their decisions, there is a potential problem here. Brehmer (1980) claims that individuals do not always improve their judgment or decisions from their experiences. Indeed, they have a number of biases when using information obtained from feedback. Most interestingly, another research finding shows that learning from experiences can lead to a multiple effect (For review see Hoch and Lowenstein, 1989). Hoch and Lowenstein argue that "feedback can increase judgmental accuracy by over 150% but in a certain task (insight problem), it can decrease predictive accuracy" (p. 605).

Regardless of the contradicting research finding, at least learning from feedback can help individuals improve

their decisions. Indeed, Janis (1989: p. 30-31) claims that to have a better decision, individuals should do the following steps:

1. Survey a wide range of objectives to be fulfilled, taking into account of the multiplicity of value that are at stake.
2. Canvas a wide range of alternative courses of action.
3. Intensively search for new information relevant to evaluating the alternatives.
4. Correctly assimilate and take into account of new information or expert judgment to which he is exposed, even when the information does not support the courses of action initially preferred.
5. Reconsider the positive and negative consequences of alternatives originally regarded as unacceptable, before making a final choice.
6. Carefully examine the costs and risks of negative consequences, as well as positive consequences that could flow from the alternative that is preferred.
7. Make detailed provisions for implementing and monitoring the chosen courses of action with special attention to contingency plans that might be required if various known risks were to materialise.

From what Janis suggests, it can be seen that learning from experiences could be useful in helping individuals improve their decisions.

Thirdly, to overcome individual limitations in obtaining and processing information, judgments or decisions can be made by groups. It is evident that groups can obtain and process information better than individuals. Accordingly, groups may make a better judgment than

individuals. This reality is also supported by research findings. For example, Libby and Trotman (1993) argue that multi person judgments in auditing may correct some individual memory errors. Moreover, Johnson (1994) pointed out that auditors were more accurate and confident in recognition memory when acting with group assistance. Potential problems related to the use of groups to overcome individual limitation in making judgment may appear, for example the cost of using groups, how to determine the optimum size and structure of group, and how to determine the criteria to evaluate group performance. In fact, as Cirincione (1994) claims, there are two main problems associated with the use of groups, namely problems of interaction processing and problems of cognitive processing. The problem may cause groups produce an inaccurate decision. However, the problems can actually be improved by some ways dependent on the complexity of tasks. Cirincione (1994), for example, suggests that the problems can be solved by using external facilitation, decision models, and information technology.

Potential problems related to the use of groups to overcome individual limitation in making judgment may appear, for example the cost of using groups

Conclusion

In making judgments individuals have cognitive limitations in searching for and processing information. They are not able to obtain comprehensive information, tend to obtain information that only supports their opinions and that is easier to recall. Individuals are also not able to combine different sources of information accurately. As a consequence of this, individuals tend to simplify their ways of making decisions by applying rules of thumb. This simplification, to some extent, can help individual to decisions. However, it can cause individuals make a wrong decision because the simplification involves systematic biases. To overcome problems associated with the cognitive limitation, individuals must recognise that they have limited capacities in making decisions. They must learn to distinguish between appropriate and inappropriate use of heuristic. Individual can also learn from their experiences and use decision aid to overcome their cognitive limitations. Finally, the use of group can be applied to solve individual's limitations in making a decision. ©



Reference

- Abdel-Khalik, A.R., and El-Sheshai, K.M., 1980, "Information Choice and Utilisation in an Experiment on Default Prediction", *Journal of Accounting Research*, Autumn, pp. 325-342
- Bazerman, M.H., 1990, *Judgment in Managerial Decision Making Process*, New York: John Wiley and Sons
- Brehmer, B., 1980, "In One Word: Not From Experience", *Acta Psychologica*, Vol. 45, pp. 223-241
- Cirincione, P.R., 1994, "Improving the Accuracy of Group Judgment: A Process Intervention Combining Group Facilitation, Social Judgment Analysis, and Information Technology", *Organisational Behaviour and Human Decision Processes*, Vol. 58, pp 246-270
- Dawes, R.M., 1979, "The Robust Beauty of Improper Linear Models in Decision Making", *American Psychologist*, Vol 34, No. 7, pp. 571-582
- Dukerich, J.M and Nichols, M.L., 1991, "Causal Information Search in Managerial Decision Making", *Organisational Behaviour and Human Decision Processes*, Vol. 50, pp. 106-122
- Einhorn H.J., and Hogarth, R.M., 1978, "Confidence in Judgment: Persistence of The Illusion of Validity", *Psychological Review*, Vol. 85, pp. 395-416
- Goodwin, P., and Wright, G., 1993, *Decision Analysis for Management Judgment*, New York: John Wiley and Sons
- Hoch, S.J., and Lowenstein, G.I., 1989, "Outcome Feedback: Hindsight and Information", *Journal of Experimental Psychology, Learning and Memory*, Vol. 14, No. 4, pp. 605-619
- Hogarth, R.M., 1980, *Judgment and Choice The Psychology of Decision*, New York: John Wiley and Sons
- Janis, I.L., 1989, *Crucial Decisions - Leadership in Policy Making and Crisis Management*, New York: The Free Press.
- Johnson, E.N., 1994, "Auditor Memory for Audit Evidence: Effects of Group Assistance, Time Delay, and Memory Task", *Auditing: A Journal of Practice and Theory*, Vol. 13, No. 1, pp36-56
- Kozlowski, S.W.J., and Ford, J.K., 1991, "Rater Information Acquisition Processes: Tracing The Effect of Prior Knowledge, Performance Level, Search Constraint and Memory Demand", *Organisational Behaviour and Human Decision Processes*, Vol. 49, pp. 282-301.
- Libby R., and Trotman, K.A, 1993, "The Review Process as A Control for Differential Recall of Evidence in Auditor Judgment", *Accounting, Organisation and Society*, August, pp. 559-574
- Northcraft, G.B., and Neale, M.A., 1990, *Organisational Behaviour*, Chicago: Dryden
- Polister, P.E., 1991, "Structuring Decision Analysis: Statistical and Psychological Consideration", *Journal of Behavioural Decision Making*, Vol. 4, pp 79-82.
- Tversky A., and Kahneman, A., 1974, "Judgment Under Heuristic: Heuristic and Biases", *Sciences*, Vol. 185, pp. 39-61