

Psychology in the Decision Making of Industrialised Building Systems (IBS): A Field of Application

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Abstract:

Research in decision making is diverse in content and perspective. There is much to be learned from more fundamental managerial disciplines. Decision making is a sub-set of human behaviour rather than a completely separate phenomenon. Currently, there are likely that few decisional issues in the application of Industrialised Building Systems (IBS) require the invention of a completely new theory. If IBS technology research bases its viewpoint only on technical and managerial issues, its development will become less relevant to the construction world at large. In order to explore decision research methods into IBS decision making, psychological elements are applied to determine their influences on the decisions of IBS technology application. This paper discusses psychological elements that are relevant to decision making and the focus is on the adoption of IBS technology in building construction. This is presented by a discussion of psychological factors influencing the decision making of construction technology application. This is followed by a review of some predictions on the future of behavioural economics in construction technology application. This paper is concluded by suggesting that the research of psychology decision making should positively contribute to decision makers' awareness, knowledge and skills, and these contributions should aim at the effectiveness of decision making in IBS technology application.

Keywords: decision making, psychology, Industrialized Building Systems.

1. Introduction

The application of psychology is usually seen to be about individual behaviour in social science and health-related studies. While these areas would not have a problem in seeing the importance of people in their organisational and industry context, it becomes noticeable that this aspect can be highly appreciated if it is also essential to investigate how people make decision in technical environment or technology context, particularly in construction industry. It can be articulated that it is impossible to understand the decision making of technology adoption without appreciating the behavioural and psychological context in which they perceive, make sense and relate to the construction practices. According to Weiten (1998), "psychology refers to the scientific studies of behaviour and underlying mental and physiological processes in acquiring knowledge with social psychology which focuses on interpersonal behaviour such as conformity and group behaviour; and cognitive psychology which focuses on higher mental process such as reasoning, information processing problem solving and decision making" (p.39). Despite considerable effort to understand and represent decision making by construction entities, there has been little attempt to integrate socio-economic, psychological and construction technology variables within a comprehensive framework.

Beyond its specific and important role in exploring Industrialised Building Systems (IBS) technology adoption, psychology decision making is fundamentally an applied discipline and this makes it highly relevant to contribute to technology adoption decision and also to the policy of IBS technology adoption itself. This view persisted when the Malaysian construction industry has been implementing the adoption of IBS technology in building construction. IBS technology is the mass factory-produced building components off-site, then they are properly assembled and joined on-site to form the final units (Badir et al. 2002). Sarja (1996) defined IBS as “the term given to building technology in which modern systematic methods of design, production planning and control as well as mechanised and automated manufacture are applied”.

2. Background

Psychology in decision making, referring to the decisional context of IBS technology adoption, may perhaps assist construction industry to address the slow adoption of this building technology by taking into account social and individual approaches to this problem. Kadir et al. (2006) reported that the current thinking on IBS is that the contractors prefer to choose conventional building system rather than proposing IBS system since shifting of building system from conventional to IBS is not motivated by cost factors and furthermore, most contractors have been exposed and trained in conventional building system for decades and there is an abundance of cheap foreign workers in Malaysia (p. 12). Thus, psychological and technological context stipulate decision makers' perception and behaviour in construction environment.

The construction dynamics in which perceptions occur, attitude are formed and behaviour takes place, also implies to look at the psychological dimensions as it is difficult to understand decision making process without taking into account the decision makers' background, exposure, viewpoint and their capacity in the building technology adoption of construction projects. In behavioural decision making, decision makers have to response the changes of its environment and they prefer to use perceptual rather than analytical processes based on the trade-off between speed and accuracy of performance (Vassey, 1994). As advances in psychology can be applied to economics in terms of human economic behaviour, Simon (1959) asserted that the decision maker's information about his or her environment is much less than an approximation to the real environment as people live in a dynamic environment with some inferences from the values and facts based on perception, believes and knowledge that characterise the personality.

According to Sauermann (2004), the following strategies are commonly used in behavioural decision making: a) weighted additive strategy which is an alternative-based that requires a large amount of information processing as the decision maker assess each aspect and weights its value according to his or her preference, b) equal weight strategy that requires less information processing and involves less information on preferences as the values of the attributes are equally weighted. c) Lexicographic strategy which requires a decision maker to select the best option based on the most important attribute. Glueck and Jauch (1988) revealed that there are three major approaches to decision making namely the rational-analytic approach (traditional view) where decision are viewed as being analytical, conscious and rational since the decision maker considers all available alternatives systematically; the intuitive-emotional approach where a number of alternatives are considered but unconscious process are used to save time and the political-behavioural approach where decision maker has to face competing pressures and decision result are the compromise of negotiation and mutual adjustment.

3. Decision Making Process and Behavioural Economics

The impression that behavioural studies could examine issues literally on cross-industries approach seems questionable. Yet, traditionally behavioural economy deals with people-economy-technology at various fields: from the social science, the management science, the business management, through technology management to the technical and engineering area. In the study of human decisions, the illumination of decision making principles and behaviour analysis can have greater impact on behavioural economics (Fantino, 2004). Moreover, the implementation of firm's strategy requires a set of careful decision criteria such as economical, psychological and cultural aspects at group or individual levels (Milani et al., 2005). According to Winquist and Larson (1998), decisions are eventually made by groups and the members prefer to select their shared rather than unshared information as shared information can influence the preferred choice but unshared information significantly influenced the quality of their decisions.

Although behavioural decision making research is concerned with how people make choices, behavioural decision making is predicted by individual differences in sensitivity for rewards but not based on impulsive personality traits (Franken and Muris, 2005). According to Leiser and Azar (2008), in economic psychology, the combination of behavioural economics and decision making promotes good interdisciplinary studies in order to explore whether decision makers have made the right economic choices based on the reasons of having made a decision, their personal beliefs and risk preferences. Identical to individual decision making, Lyon et al. (2000) stated that firms' behaviour can be observed, managed and measured.

4. Psychological Theory

Cognitive and social psychology are among fields that provide knowledge bases needed to design the technology adoption information for supporting technology decision for effective construction individual, firms and industry responses to IBS technology adoption. The basis of team decision is personal or individual decision and this decision-making behaviour depends on two major categories namely social psychology and cognitive psychology (Ying et al., 2005). According to naturalistic theory, decision making is based on personal experience and competence without quantitative data but considering cognitive, behavioural and environmental factors in real world (Lizárraga et al., 2007). In social psychology, people's knowledge and thought within the world are not standardised due to their interests, degree of knowledge aimed at changes, facts and general ruling principles (Schuetz, 1944). Moreover, with the new social movements as pointed out by Stern (1999), change in attitude and behaviour can be explained by social psychological theory. Whereas, in cognitive psychology, Bandura and Jourden (1991) discovered that decision making research involves the understanding of how decisional activities are affected by judgemental operations as in dynamic environment; decisional rules must be learned through exploratory experiences by self-belief of value, personal goal setting, self-evaluation and the quality of analytic thinking that requires the effective cognitive processing of ambiguous and uncertain information.

As a part of cognitive psychology, human judgement and decision making behaviour that is characterised by outcome and information uncertainty involves the process of basic cognitive mechanism using a mental model which organises prior experience and information based on problem's proposition throughout the years of learning and maturation (Pitz and Sachs, 1984). Kim et al. (2008) pointed out the choice satisfaction of decision making could be increased by cognitive control processes with choice options evaluations prior to making a decision and the integration of cognitive and emotion evaluation to produce positive effects. Based on psychological theory, decision makers have their own cognitive effort considering the justifiability of alternatives, the properties of real world decision environment and bias in decision making which arises from different sources (Loewenstein and Lerner, 2003).

5. Psychology and Decision Making

Traditionally, subjects of psychological research, both fundamental and applied, tend to be conceived at the individual level: the mind, conscious experience or obvious behaviour is all studied in their nature and characteristics of functioning within a single person or firm. Generally, decision making is a behaviour that reveals the visible outcomes of psychological process. Decision makers for instance, tend to emphasize the priority of decision principles and all principles can be important but their relative importance can depend on the decision making itself. Moreover, the causal factors may interact. For example, attitudinal factors can become more influential when contextual factors do not exert strong pressures on decision making and even strong financial incentives may fail to change behaviour unless information is provided in effective ways. For these reasons, conclusions about the causes of individual decision making are unlikely to generalize to contexts with very different infrastructures, institutions or incentive structures. Psychology alone cannot produce adequate understanding of environmentally significant individual decision making. An interdisciplinary approach is needed in which insights and concepts from psychology are combined with those from economics, sociology, and other relevant disciplines. In this matter, contemporary research on the psychology of decision making by Messick and Bazerman (1996) involves three major groups of theories that are theories about the world in terms of the ways in which our decisions influence the world based on the judgement of risk, discounting the future, uncertainty, perception of causes, focus on people and moral responsibility; theories about other people in terms of how others influence the ways in which people make decision based on ethnocentric perception as “our” way is normal and preferred and other ways are inferior, besides the element of stereotype and theories about ourselves in terms of individual traits based on illusion of superiority, illusion of favourability, illusion of optimism, illusion of control, overconfidence and self-serving fairness biases.

Usually, the unique nature of strategic decisions involves complexity, uncertainty, high cost, absence of information and long term effects require substantial elements of judgements and a highly detailed analysis by individuals with the most appropriate psychological qualifications in order to improve the quality and effectiveness of these decisions (Gilligan et al., 1983). Given the shortcomings of the classical decision theory or rational-economic model, an alternative perspective has emerged that provides a more descriptive view of managerial behaviour which termed as a behavioural theory of decision making or administrative model which acknowledges the real-world limitations on manager’s decision making that provides bounded-rationality where decision makers are restricted in their decision making process (Vecchio et al., 1992). Irrationality of individual decision making is examined from a psychological perspective, thus it is important to reduce or minimise those psychological factors such as perception, attention, memory, heuristics, bias and other factors like personality, experience, motivation, feelings, emotions, skills and abilities, which limit rationality in decision making (Jennings and Wattam, 1994). However, in recent years this assumption has been challenged by behavioural economists, who have identified additional psychological and emotional factors that influence decision-making (Lerner et al., 2004).

6. Psychology in IBS Decision Making

Much work within construction economics is concerned with understanding and modelling the processes and consequences of decision making among construction firms. The usefulness of predicting the behaviour of decision makers in construction industry with respect to IBS policy and technology assessment is not well known and models of decision making in this area should be developed for a variety of specific situations. As the science of human behaviour, psychology is necessary to understand and manage the decision making of technology adoption. Psychology is needed to clarify the behavioural and social processes underlying IBS technology adoption, to

determine the effects of environmental influences on IBS decision making, to specify effective behavioural strategies for reducing conventional construction methods and to assist policy-makers in formulating and improving IBS technology adoption.

A crucial decision making issue in IBS technology adoption can be adequately addressed by incorporating behavioural aspects and how best to reveal technology adoption and responses to the policy of construction practices. This is not a straightforward issue of applying behavioural elements in technological and technical construction practices. Thus, it requires the transformation and integration of psychology, strategic management, economics, technology management and construction practices knowledge. It involves managerial and technological process informed by social science knowledge. As illustrated by Figure 1, psychology in IBS decision making can be represented in a contextual framework with the relationship between the way of thinking and behaving of individuals as a decision makers and their environment. This includes the internal and external environment of decision makers in construction industry.

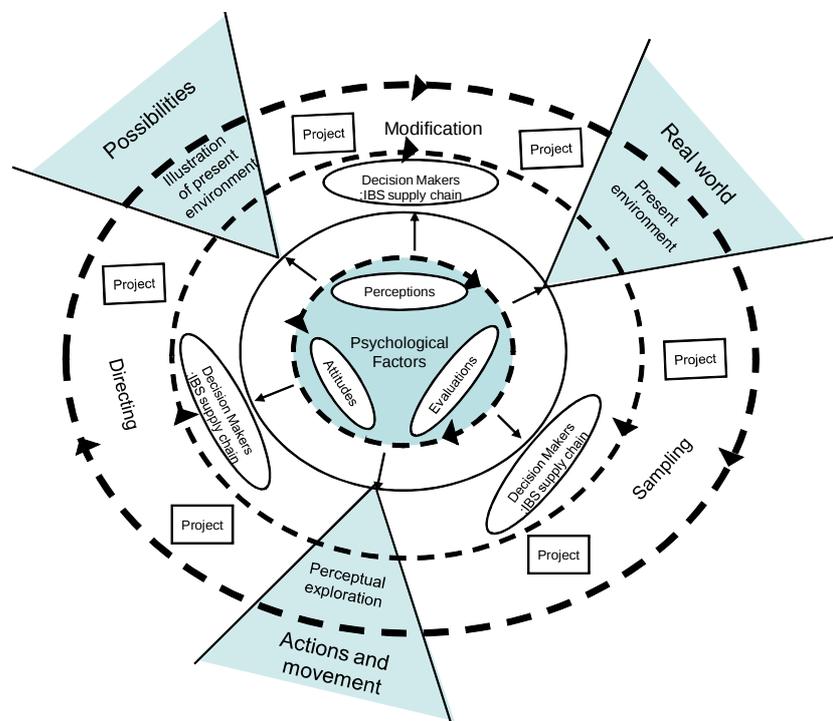


Figure 1: Contextual Framework of Psychology Factors in IBS Decision Making

Psychology in decision making explores individuals and groups decision making in their social and physical context, by giving major focus to IBS supply chain members and IBS technology adoption based on their perceptions, evaluations, attitudes, representation and accompanying behaviour. Economics and social psychology are heuristics tools for identifying factors that influence specific behaviours such as values, attitudes, habits, social norms, personal norms and perceived behavioural control, meanwhile economics focuses on the influences of internal and external factors explaining intentions to act (Kallbekken et al., 2008). Addressing the concept of attitude, Dohmen et al. (1989) clarified that an entity becomes an attitude object if a person states an evaluative judgment toward which a cognitive, evaluative or intentional orientation of an individual is directed (p.19). According to Eiser and van der Pligt (1988), the concept of attitude is important in social psychological theories as attitude is crucial in human decision making because behaviour is seen as determined by intention and intention is a joint product of attitude towards the behaviour (p.26). Moreover, decision making process in organisational context comprises a set of roles with different attitudes related to the process based on participant's roles and motivations (Vári and Vecsenyi, 1984). In the case of building technology adoption, as

illustrated by Figure 2, the perception of IBS technology, may or may not be based upon information and knowledge and/or psychological reaction towards IBS decision.

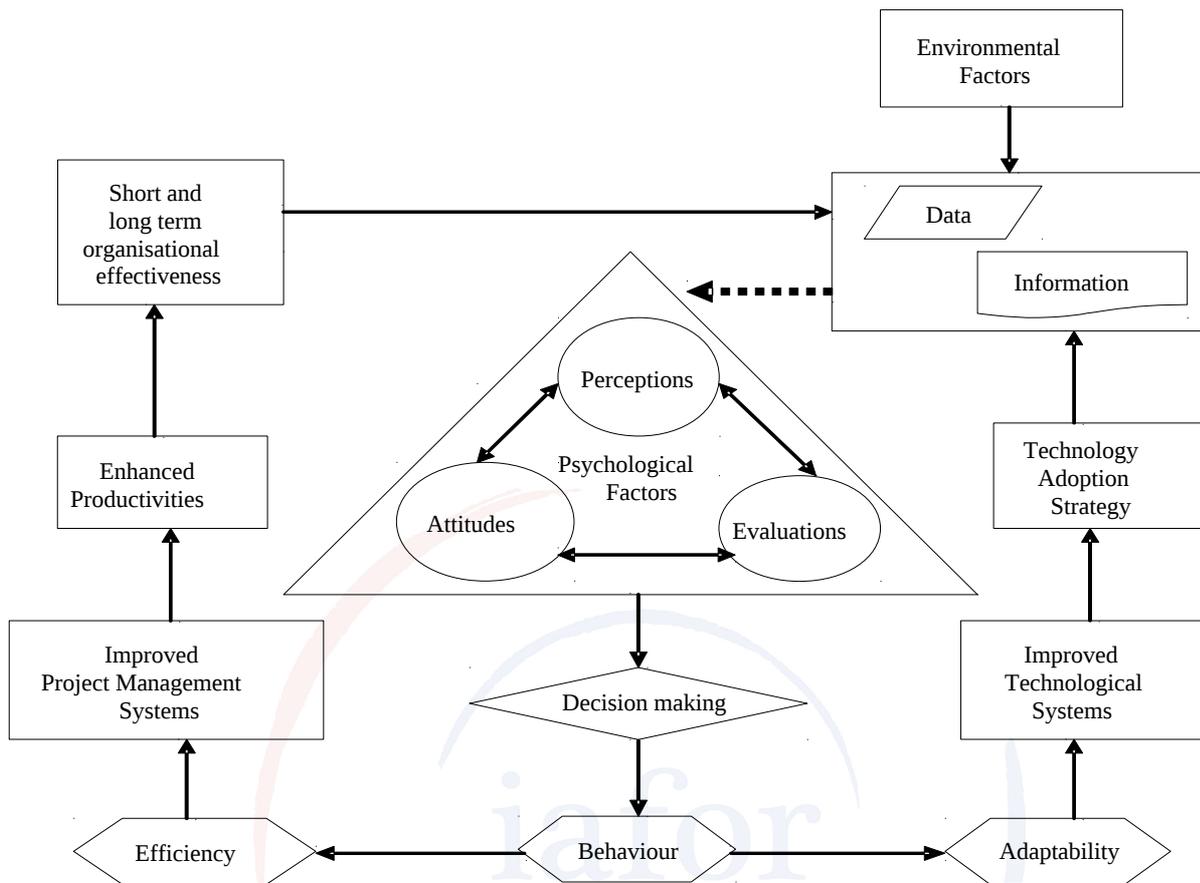


Figure 2: Conceptual Model of Psychology Factors in IBS Decision Making

In decision making, many beliefs and values may underpin an attitude. The open attitude trait might also be important in many firm decision-making situations, especially relating to information gathering and in the adoption of new technology. There are obvious limits to how much of individual behaviour can be explained as a function of values, attitudes, personal norms, and other social-psychological factors. Besides that, psychology in decision making also focuses on both the effect of environmental influences such as politics, economic, social, and technology factors on behaviour in addition to how decision makers perceive and acts on IBS technology adoption based on these factors. Behavioural and environmental factors are one way or another linked in their effects on the perceptions and behaviour of decision makers as these factors must be thoroughly considered in technology decisions. In order to effectively understand these factors, psychology decision making in IBS technology adoption aims at identifying processes which regulate and mediate their relationship. This conceptual model also focuses on environmental influence and the consequences of human behaviour. According to Lin (2003), technology decisions are shaped by a set of organisational factors based on one's self-confidence in evaluating technology innovations and the success or failure of technology adoption is based on the need for innovativeness and users' experience as a result of systems control by government and industry policies with system factors such as regulatory, technology culture and industry trend.

Fox (1984) stated that "it cannot be claimed that human knowledge is exclusively rule-based as perception and imagery are important in decision making" (p.315). As advances in psychology can be applied to economics in terms of human economic behaviour, human decision making

conceptualises the human mind based on differences in perceptions, subjective experience and future judgments with cost benefit consideration which helps in understanding decision making impacts (Pronin et al., 2008). Psychological science and its insights have not been fully utilised to understand slow technology adoption. Yet psychology can contribute in at least three ways: by exploring the behavioural factors of decision making that is important for causing technology reluctant behaviour, by contributing to the understanding of interdisciplinary areas in IBS technology adoption and by determining significant psychological dimensions that influence IBS decision.

7. Rationale of Psychology Application in IBS Decision Making

In order to meet these demands on behavioural science, psychology will have and need the opportunity to expand its scales of analyses in the study of human cognition and action plans reinforcing variables operating on behavioural learning, attitude formation and perceptions. Not only will such expansions of psychology's traditional scale of study enhance the input, psychology discipline should have contributions to other industry. Most likely psychology discipline will also further theory development in other areas, in particular towards enhanced technology adoption, within the discipline itself as behavioural research on IBS decision making is based on several ideas:

a) Values and attitudes

The idea to adopt IBS technology in building construction is to generate efficiency in project management and achieving the effectiveness of resources utilisation especially on workforce, site management and overall cost structure. The element of attitude is also significant in determining the intention in the use of building material that should be considered with other additional realistic behavioural elements such as task and personal characteristics (Bysheim and Nyrud, 2009). People's attitude towards the improved construction activities should be changed, especially in the developing countries like Malaysia. There are several problems with this belief. First, pro-conventional method and upholding of this status-quo are already strong in the most of established construction entities. Also the connection of values and attitudes to behaviour are unpredicted because; besides behaviour complexity, behaviour also depends on a variety of other affecting factors such as policy, infrastructure, institutions, incentives and individuals' skills, knowledge and abilities regarding attitude-based behaviour. In most cases, the input to behaviour is its immediate context, besides optimistic values. Changing values may also have a huge influence on behaviour in the long term but it is mainly as an indirect factor unlike policies, institutions and incentives that shape behaviour.

b) Skills, knowledge and awareness

Normally, there is a belief that skills, knowledge and increased awareness are the key to adopt construction technology in solving construction project difficulties. However, broader knowledge on efficient construction technology such as the widespread recognition of overall effects from IBS technology adoption may have larger effects, but not much is known about why some IBS technology application lead to industry adoption, government policy and social movement activity. In this regard, the assimilation of psychological dimensions into the skills, knowledge and awareness of construction technology is beneficial in understanding IBS technology decisions.

c) Firm's option

Although the attribute of adopting construction technology is based on firm's choices, the major causes of most construction delays, construction waste and dependency on foreign labour are the actions of construction firms. Thus, changing construction entities' attitudes towards better

construction practice by adopting IBS technology can contribute to higher construction quality and productivity.

d) Motivation

Basically, perceived IBS technology drive tends to encourage adaptive technology only when the benefits are perceived to be significant and when cost-effective responses are well-known and available. Technology adoption without the perceived ability to cope leads to maladaptive responses such as minimizing the risk of negative assessment on IBS technology.

Dealing with IBS technology decision requires the synergistic role of behavioural component particularly on psychology in addition to technical, managerial and technological specialists. The theoretical and methodological approaches of psychology within decision making tasks and IBS technology adoption are different but complementary. Thus, it may be beneficial if the lessons learnt in one research domain will be tried and tested in the other. In order to achieve this, synergistic goals between IBS technology adoption and psychology decision making as shown in Table 1 should be explored in collaboration with environmental influences.

Table 1 Synergistic Goals between IBS Technology Adoption and Psychology Decision Making

Goal:	IBS Technology Adoption	Psychology in Decision Making
Political	To support IBS technology adoption regulations, guidelines and policies.	To cultivate positive attitude towards technology policy.
Economic	To create overall cost effectiveness in project implementation.	To evaluate all economic rationales without 'bias' consideration in decision making.
Social	To encourage less dependency on foreign labour.	To foster positive perceptions towards workforce efficiency.
Technology	To promote efficient and effective building technology.	To encompass technological mind-set in decision making.
Consumerism	To provide improved building technology with environmental concern.	To perceive consumer as an important consideration in decision making.

In decision science, technology adoption decision involves inter-firm coordination, interplay reaction across individuals in different stakeholders group and interventions based on contemporary research problem and multidisciplinary work with the consideration of technology outcomes, environmental factors, feelings, reactions and personality characteristics (Venkatesh, 2006). Above all, the incorporation of psychology in decision making may clarify the perceptions and attitudes about IBS technology adoption, maintained by different stakeholder groups as a basis for continued disregard, for business-as-usual, or for strategic change and policy acceptance regarding IBS technology. Thus, to be effective, technology adoption strategy must be carefully regulated towards those evaluations, perceptions and attitudes. However, the psychosocial factors have been approached with less attention and clarity than either the technical or economic dimensions of IBS technology. This represents a challenge for the incorporation of psychology in IBS decision making as psychology has the potential to make a significant contribution to sustainable construction policies.

8. Conclusion

Although technical skills, knowledge, evaluation and assessment have an important contribution to make the resolution of slow IBS technology adoption that are related to the uphold of conventional building methods instead of IBS technology, this situation is the outcome of

maladaptive technological behaviour and thus require the contribution of social and managerial science. Only interdisciplinary approaches will provide effective strategies to address the major slow IBS technology adoption in Malaysian construction industry. Behavioural economic studies particularly on psychological dimensions will have and need the opportunity to expand its scope in the study of technology decisions. Psychology has contributed and can offer more to the understanding processes beyond the individual decision that is important to construction technology change. Notwithstanding this, it should not be assumed that a heightened technology awareness of IBS in building construction will automatically lead to firm's adoption of more technological based building method rather than conventional method. Psychological standpoints put forward that construction firms are more likely to concern about issues according to financial interests particularly on profit generation from construction projects rather than the real process of building technology adoption.

REFERENCES:

- Badir, Y.F., Kadir, M.R.A. and Hashim, A.H., 2002. Industrialised building system: construction in Malaysia. *Journal of architectural engineering*, 8 (1), 283-294.
- Bandura, A. and Jourden, F. J. (1991) Self-Regulatory Mechanism Governing the Impact of Social Comparison on Complex Decision Making, *Journal of Personality and Social Psychology*, Vol. 60, No. 6, pp 941-951.
- Bysheim, K. and Nyrud, A. Q. (2009) Using A Predictive Model To Analyse Architects' Intention of Using Wood in Urban Construction, *Forest Product Journal*, 59, 7, pp. 65-74.
- Dohmen, P., Doll, J. and Feger, H. (1989) A Component Theory for Attitude Objects, p.19 in Upmeyer, A. (1989) *Attitudes and Behavioural Decisions*, Springer, New York.
- Eiser, J. R. and van der Pligt, F (1988) *Attitudes and Decisions*, Routledge, London.
- Fantino, E. (2004) Behaviour-analytic Approaches to Decision Making, *behavioural Processes*, 6, pp 279-288.
- Fox, M., Barbuceanu, M. and Teigen, R. (2000) Agent-oriented Supply-Chain Management, *The International Journal of Flexible Manufacturing Systems*, 12, 165-188.
- Franken, I. H. A. and Muris, P. (2005) Individual Differences in Decision Making, *Personality and Individual Differences*, 39, pp 991-998.
- Gilligan, C., Neale, B. and Murray, D. (1983) *Business Decision Making*, Phillip Allan Publishers, Oxford.
- Glueck, W. F. and Jauch, L.K. (1988) *Business Policy and Strategic Management*, 5th Edition, McGraw Hill, Singapore.
- Jennings, D. and Wattam, S. (1994) *Decision Making: An Integrated Approach*, Pitman Publishing, London.
- Kadir, M. R. A., Lee, W. P., Jaafar, M. S., Sapuan, S. M. and Ali, A. A. A. (2006) Construction Performance Comparison Between Conventional and Industrialised Building Systems, *Malaysia Structural Survey*, Vol. 24 No. 5, pp. 412-424.

Kallbekken, S., Rise, J. and Westskog, H. (2008) Combining Insights from Economics and Social Psychology to Explain Environmentally Significant Consumption, Report of Centre for International Climate and Environmental Research, Oslo, Norway, 1-15.

Kim, S., Healey, K. M., Goldstein, D., Hasher, L. and Wiprzyca, U. J. (2008) Age Differences in Choice Satisfaction: A Positively Effect in Decision Making, *Psychology and Aging*, Vol. 23, No. 1, pp 33-38.

Leiser, D. and Azar, O. H. (2008) Behavioural Economics and Decision Making: Applying Insights from Psychology to Understand How People Make Economic Decisions, *Journal of Economic Psychology*, 29, pp 613-618.

Lerner, J. S., Small, D. A. and Loewenstein, G. (2004) Heart Strings and Purse Strings: Carryover Effects of Emotions on Economic Decisions, *Psychological Science*, Vol. 15, No. 5, pp 337-341.

Lin, C. A. (2003) An Interactive Communication technology adoption model, *Communication Theory*, 13, 4, pp 345 – 365.

Lizárraga, M. L. S. A., Baquedano, M. T. S. A. and Caedelle-Elawar, M. (2007) Factors That Effect Decision making: Gender and Age Differences, *International Journal of Psychology and Psychological Therapy*, Vol. 7, No. 3, pp 381-391.

Loewenstein, G. and Lerner, J. (2003) in *The Handbook of Affective Science*, R. J. Davidson, H. H. Goldsmith, K. R. Scherer, Oxford Univ. Press, Oxford,

Lyon, D. W., Lumpkin G. T. and Dess, G. D. (2000) Enhancing Entrepreneurial Orientation Research: Operationalizing and Measuring a Key Strategic Decision Making Process, *Journal of Management*, Vol. 26, No. 5, pp 1055-1085

Messick, D. M. and Bazerman, M. H. (1996) Ethical Leadership and the psychology of Decision Making, *Sloan Management Review*, Winter, pp 9-22.

Milani, A. S., Shanian, A. and El-Lahham, C. (2005) A Decision-based Approach For Measuring Human Behavioural Resistance to Organisational Change in Strategic Planning, *Mathematical and Computer Modelling*, 48, pp 1765-1774.

Pitz, G. F. and Sachs, N. J. (1984) Judgement and Decision, *Annual Review Psychology*, Vol. 35, pp 139-163.

Pronin, E., Olivola, C. Y. and Kennedy, K. A. (2008) Doing Unto Future Selves As You Would Do Unto Others: Psychological Distance Decision Making, *Personality and Social Psychology Bulletin*, Vol. 43, no. 2, Feb, pp 224-236.

Sarja, A., 1996. Towards practical durability design of concrete structures. Proceedings of 7DBMC, 7th international conference on durability of building materials and components, Stockholm, Sweden, E&FN SPON, London, 1238-1247.

Sauermann, H. (2004) Vocational Choice: A Decision Making Perspective, *Journal of Vocational behaviour*, 66, pp 273-303

Schuetz, A. (1944) The Stranger: An Essay in Social Psychology, *The American Journal of Sociology*, Vol. 49, No. 6, pp 499-507.

Simon, H. A. (1959) Theories of Decision-making and Behavioural Science, *The American Economic Review*, Vol. 49, No. 3, pp 253-283.

Stern, P. C. (1999) A Value-Belief-Norm Theory of Support for Social Movements: The Case of Environmentalism, *Human Ecology Review*, Vol. 6, No. 2, pp 8 - 97

Vári, A. and Vecsenyi, J. (1984) Designing Decision Support Methods in Organisations, *Acta Psychologica*, 56, 141-151 in Borcharding, K., Brehmer, B., Vlek, C. and Wagenaar, W. (1984) *Research Perspectives on Decision Making Under Uncertainty*, 9th Edition, Groningen, Netherlands.

Vassey, I. (1994) The Effect of Information presentation on Decision Making: A Cost-benefit Analysis, *Information and Management*, 27, pp 103-119.

Vecchio, R.P., Hearn, G. and Southey, G. (1992) *Organisational Behaviour: Life and Work in Australia*, Harcourt Brace, Sydney.

Venkatesh, V. (2006) Where to go from here? Thoughts On Future Directions for Research on Individual-level Technology Adoption with A Focus on Decision Making, *Decision Science*, Vol. 37, No. 4, pp 497 – 518.

Weiten, W. (1998) *psychology: Themes and Variations*, 4th Edition, International Thompson Publishing, California.

Winqvist, J. R. and Larson, J. R. (1998) Information Pooling: When It Impacts Group Decision Making, *Journal of Personality and Social Psychology*, Vol. 74, No 2, pp 371-377.

Ying, M., Kefan, X. and Meizhen, N. (2005)

http://www4.pucsp.br/icim/portugues/downloads/pdf_proceedings_2008/65.pdf