Asian Journal of Accounting and Governance **12**: 155–168 (2019) ISSN 2180-3838
(http://dx.doi.org/10.17576/AJAG-2019-12-13)

Management Control System and Innovation: Implication for Malaysian Manufacturing Innovation Performance

SALMA KHALIDAH SA'ADON, AMIZAWATI MOHD AMIR & ROZITA AMIRUDDIN

ABSTRACT

The study extends prior management control system knowledge by observing the significance of the information generated in facilitating innovation efforts which, in turn, improves the innovation performance of firms. The paper explores the role of company mission and vision statement, job scope description, and performance measurement system as sources of management control information to support firms' innovation activity and to manage their performance in facing present market demands. Survey was administered to the Product Development Managers randomly selected from the Federation of Malaysian Manufacturers Directory. Based on a total of 102 usable responses, evidence showed that firm's value positively relates to firm's innovation activities. The study discovers that diagnostic information is positively significant with incremental innovation, whereas interactive information is significantly associated with radical innovation. Evidently, both types of innovation enhance a firm's innovation performance. Rather than assessing the immediate return of innovation efforts on firms' financial performance, the study provides support showing both types of innovation do enhance firms' innovation performance.

Keywords: Management control system; radical innovation; incremental innovation; innovation performance; manufacturing

INTRODUCTION

Since the turn of the 21st century, there has been a massive effort among businesses towards innovation. Innovation is an organizational value creator. Its importance has been well recognized as practitioners and academics have consistently emphasized innovation as a driver of firm's superior performance (Bisbe & Otley 2004; Wu & Chiu 2015). Given the globalization of the economic market, being creative and innovative provide greater opportunities for business success. To choose not to be creative in producing new products/services is no longer an option; indeed, firms that decide not to become involved in innovation are prone to encounter sustainability challenges. This development is attributed to the rapid advancement of technology, along with the changing requirements of customers. With better knowledge and greater purchasing power, the new generation of customers' demands frequent product improvement in a shorter time. Innovation does not imply a totally new idea. The expectation concerning the degree of newness exists along a continuum, ranging from radical changes to a slight improvement in either the products or processes. Accordingly, Ylinen and Gullkvist (2014) described radical innovation as a dramatic change in the product or production process using new technology, while incremental innovation involves a minor improvement to the existing product or production. Literature (Edison et al. 2013; Hess 2014; Fores & Camison 2016) dictates that innovation is the outcome of newness. Regardless of the degree of change, innovation and creativity are strategic necessities for businesses to remain relevant in the market.

The importance of creativity in manufacturing, both product and production process innovation cannot be emphasized enough. Extensive studies (Al-Sayed & Dugdale 2016; Bisbe & Otley 2004; Dangelico et al. 2017; Shahin et al. 2017) have been conducted examining the impact of innovation in the manufacturing industry, in which innovation has been acknowledged as being the key success factor in the industry. The same view was adopted by the Malaysian Government as innovation in the manufacturing industry is a critical agenda in the economic transformation programme. Innovation not only has an important role in ensuring business sustainability, but also has a great impact on driving the economy (Hausman & Johnston 2014). However, innovative thinking does not come naturally. The level of innovation activity is somewhat moderate and is progressing at a slow rate (Gunaselan 2006; Global Innovation Index 2019). Among the common reasons for the slow progress are the operational and market uncertainty surrounding the innovation activities, and also the reluctance of employees to become involved in carrying out new ideas. The unwillingness of employees to participate in the innovation activities is due to insufficient information in monitoring and assessing their performance, which is often associated with unclear roles and responsibilities (Faizuniah & Aizzat 2019). For businesses, their success is evaluated by the amount of reported profit and the fact that businesses mostly produce predictable, reliable and standardized outcomes. Conversely, failure is a common part of being innovative along with a delay in reported profit. Innovation demands that both the firms and the people are willing

to tolerate and manage the risks and mistakes. Thus, the problem faced by many firms is being able to balance the market requirements of being innovative and reporting good economic return, which ostensibly discourages firms from innovating.

These barriers to the willingness to embark on innovation seem to be related to the element of uncertainty and ambiguity surrounding the activities. Uncertainty is defined as the difference between the amount of information required to perform a specific task and the amount of information already possessed by an organization (Galbraith 1974). The rule is that the greater the uncertainty, the greater the amount of information necessary (Ewusi-Mensah 1981). The decision and action process relies on the communication and information circulating within the organization, which provide paths for others to follow, and have to be managed effectively to enable firms to integrate their effort in supporting innovation endeavour. Simons (1995) considered Management Control Systems (MCS) as being the formal information-based routines and procedures used by the management to maintain or change the organizational behaviour. Hence, MCS facilitates the process of identifying the steps and procedures to be taken to transform the firm's objectives in all parts of the organizational functions (Widener 2007; Akroyd & Maguire 2011), which, in turn, may stimulate innovation. Other researchers deliberate that the interconnection between the management information system and the assessment/decision-making process is the main source to help manage the uncertainty (Davila 2000; Ylinen & Gulkvist 2014; Wijethilake et al. 2018). Building upon Galbraith's concept of certainty, the present study bridges the concept of organizational uncertainty and MCS information. Hence, the objective is to understand to what extent MCS information may influence the degree of innovation activity, and, subsequently, examining the effects on the firm's innovative effort.

This paper contributes to research on innovation and MCS by examining the role of information in promoting firms' innovation effort (i.e. radical and incremental). Considering the delay between the innovation and its economic return, this paper provides an empirical assessment of the effect on firms' innovation performance. The study also observes the relationship between the use of information in promoting innovation from the perspective of Malaysian manufacturers. The case of Malaysia is very interesting as the nation is moving towards becoming a newly industrialized country, and the idea of innovation as a business value creator remains somewhat understudied (Ferlito 2017). Besides the claim of a high degree of uncertainty and the rigidity of the organization, there is great emphasis on reporting yearly profit growth is one of the reasons that dampens the innovation activities of Malaysian businesses (Jusoh et al. 2007; Wan Suhazeli 2014). However, innovation is critically important for Malaysian business survival and needs to be developed and managed within an organization. Considering the limited empirical observation from the Malaysian manufacturers' perspective, this paper aims to explore the relationship between the use of MCS information and their innovation endeavour along with the effect on firms' innovation performance.

This discussion begins with a review of the innovation concept. The paper then deliberates on the role of information as a determining factor concerning the degree of innovation and innovation performance, and, subsequently, introduces the hypothesized relationships. The research method is discussed next. Finally, the findings are presented and discussed with some comments concerning the limitations and direction for future research.

Literature Review and Hypotheses Development

Innovation

Innovation is a strategy for solving the needs of organizations to become more competitive. It is generated through the use of technology, creative ideas, and new knowledge. It is defined as the production, acceptance, and implementation of creative ideas in an organization (Amabile 1998; Thompson 1965). Innovation also concerns the outputs developed from a combination of the latest technologies and new knowledge emerging from the organizational efforts (Lee 2004; Pawanchik et al. 2011). Innovation adds value to customers by producing products that are different from the original product in terms of quality, ease of use, environmental protection and lower cost (Gunaselan 2006). Innovation can also be the effort to improve the efficiency and effectiveness of the production processes (Lukas & Ferrell 2000).

Knight (1967) introduced the concept of innovation by categorizing it into product versus process innovations. Knight defined product innovation as an effort to introduce new products or improvements of the existing products to customers who can realize the impact of innovation on the product received. Product innovation is carried out with the intention to either create new markets or to meet the current market, while process innovation is undertaking changes or improvements to the process in producing/ delivering (new) products. Changes made in terms of technique, equipment and/or software have a significant impact on the level of production, the cost of production and the quality of the products produced (Ettlie & Reza 1992; Utterback 1971). Innovation has also been categorized into technical as opposed to administrative innovation (Daft & Macintosh 1978; Damanpour & Evan 1984). Technical innovation is related to product/ service and its production processes, which constitute the core business operations, whereas administrative innovation is related to changes in the support processes, such as the organizational structure, administrative organization, and human resources.

A recent approach prefers to observe the changes with regards to the degree of novelty (Ylinen & Gulkvist 2014). The changes are with regards to knowledge/

technology in the products, technical processes or even the administrative activities undertaken by the firms. The newness is then translated into two types of innovation, namely, radical versus incremental innovation. Radical innovation is innovation that involves the use of technology and new knowledge or makes a fundamental change to the routine activities of organizations that bring dramatic changes to products and processes while incremental innovation creates minor changes to the product and process technology (Dewar & Dutton 1986; Gunaselan 2006). Both product and process innovation are equally important in the manufacturing sector to ensure that the products are not easily imitated or interchangeable with their competitors' products. Process and product innovation change the production process and product design (Eshraqi 2012). Innovation processes are implemented to help an organization achieve economies of scale or reduce manufacturing costs and product prices (Zahra & Das 1993). At the same time, in terms of output, the resulting product must always meet the changing demands of consumers. Past studies have proven that product and process innovation in the manufacturing sector helps to improve the quality of products, increases product diversity and improves product value for customers and, for that reason, the focus of this study is on both incremental and radical innovation.

Incremental and radical innovations introduce different risk levels to the firm. Radical innovation substantially alters the routine activities in production, whereas incremental innovation does not require a major change in terms of knowledge and technology, and can be an expansion of the knowledge and existing skills to improve the production efficiency and delivery, expand the range of products or produce better functions and designs. In short, radical innovations are more uncertain than incremental. To embark on innovation, manufacturers need to broaden their perspective beyond the product and process. They need to strategize to develop the capabilities and working environment that can spark creativeness. Managers have to know the appropriate approach to manage the different types of innovation as the activities involve a great extent of uncertainty (Davila 2000). Accordingly, Lievens and Monert (2000) underlined the importance of information to reduce the uncertainty in dealing with managing firm innovation activities. Therefore, it is expected that the use of information may differ in accordance with a firm's innovation activity.

MANAGEMENT CONTROL SYSTEM

MCS is a system that consists of various forms of control mechanism, which are used for various functions to achieve the main objective of the organization's goals. Simons (1995) viewed MCS as a formal system that regularly seeks to either keep or change the pattern of activity of the organization. The information assists managers in the process of providing feedback and recommendations to help managers in making decisions (Chenhall 2003). According to Damanpour (1987), the availability of useful information is the catalyst to transform the creative ideas into real product/process. In recognizing the pertinent role of information to facilitate and influence decisions and behaviour, researchers (Busco et al. 2008: Langfield-Smith 2007; Otley 1999) have emphasized that the development of information systems is the underlying foundation for managing firm's performance. Briefly, MCS is a formal and informal-based information system that helps managers to reshape existing boundaries by supporting the development of new organizational arrangements through which organizational goals can be achieved. In recognizing the pertinence of MCS information in facilitating the organizational change process, a proper match between the types of information and innovation activities should be established. Based on Tushman and Nadler's (1978) Organizational Information Processing theory, the information may help organizations to manage uncertainty. The availability of information reduces uncertainty by making one alternative more likely than the others in creating a sense of security, as the supply of information will reduce the information gap. Among the roles of information is acting as a medium of communication within an organization or even a unit. MCS information facilitates the communication process between the management and the employees with regards to building up the organizational values and culture. The information can also be a motivational driver to motivate employees to act in line with the goals (Anthony & Govindarajan 2007). Frow et al. (2010) emphasized that through communication, organizations provide the impetus for strategic adjustments, which assist them to venture into new opportunities.

Simons (1995) Levers of Control (LOC) framework observes the relationship between strategy and control. The four levers of control (i.e. belief systems, boundary systems, diagnostic control systems, and interactive controls systems) work simultaneously to ascertain how the organization and its members act towards their strategic agenda (Bisbe & Otley 2004; Martyn et al. 2016; Sakka et al. 2013; Su et al. 2014). The belief systems articulate the basic values and mission that management would communicate and continuously reinforce, aligned with the organizational strategic directions. The boundary systems set limits to reduce the risk of undesirable behaviour, while the diagnostic control systems communicate and monitor the key business activity performance, and the interactive control systems encourage discussion and the learning process related to the strategic uncertainty in the changing business environment. Ostensibly the MCS provides information to help organizations and their members to make better decisions and improve performance (Rezania et al. 2016). In extending the LOC framework, the use of information in managing innovation activity is further discussed.

Belief systems information is usually in the form of a formal document, such as the firm's vision and mission statements. Vision is considered to be the ability to see something in the future (Larwood et al. 1995), and thus it gives employees an impression concerning the future and what the firm wishes to achieve or where it wants to be positioned (Grochels 2012). Vision articulates the direction that the people need to embrace (El Namak 1992). The mission statement also involves the dissemination of information regarding the core values and how to achieve the core values of the organization. The mission statement describes what actions need to be implemented by the organization to maintain or improve the value of all the stakeholders (Chenhall 2003). Additionally, effective vision and mission statements are capable of providing aspiration (Johnson et al. 2005) and motivating employees to find, explore and create an invention or new opportunities (Simons 1995). Brown and Eisendhart (1995), and Grochels (2012) also believed that the vision and mission could grant the autonomy and authority for employees to perform tasks as it could uncover new initiatives in order to achieve the firm's goals. However, most importantly, managers need to communicate belief (vision and mission) through a set of communication channels, either formally or informally, such as discussion in the learning programme, feedback session, questionnaire, e-mail or through the disclosure of the document itself (Simons 1995; Marginson 2002). Most importantly, such information not only encourages employees to achieve the organizational targets, but, also, are able to encourage strategic changes to take place in the firm.

Information communicated through the beliefs system facilitates the implementation of innovation as it underlines the support and encouragement given to employees to acquire new knowledge, especially with regards to technology, markets, and competitors. Brentani (2001) highlighted that emphasis on information systems in the organization encourages employees to be committed towards product/process changes in the market along with fulfilling customers demand. The intensification of the vision and mission is clear guidance to encourage workers to take risks and exhibit entrepreneurial characteristics (Brentani & Kleinshmidt 2004). For radical innovation, such information may guide and inspire managers to continue learning and experimenting to create a unique product in the market. Similarly, incremental innovation needs the same working environment to establish the confidence to enhance the quality of the existing products and processes (Hoonsopon & Ruenrom 2012). Since management need to motivate the employees continuously by creating an organizational culture that appreciates innovative ideas, it is predicted that:

H1a: Belief information has a positive relationship with radical innovation.

H1b: Belief information has a positive relationship with incremental innovation.

Boundary systems information generated from MCS is in the form of regulations, code of business ethics, and formal procedures with the intention to create a guideline to help employees perform tasks. Such information explains to the employees their scope of work and their responsibilities that need to be fulfilled to attain the organizational goals, and also provides limits to prevent misconduct that would adversely affect the firm's performance (Mundy et al. 2013). Boundary information not only sets a limit on employees conduct (rules, formal procedures, and codes of conduct of business) but also in terms of strategic matters. Boundary information underlines suitable new opportunities to be ventured, and, at the same time, sets the limits to prevent venturing into high-risk decisions or even actions that negatively affect the performance of the organization. Again, the information only becomes useful knowledge if it is effectively communicated to the whole organization (Simons 1995; Marginson 2002). However, setting a limit places a restriction in terms of exposing the firm to business risk, and, for that reason, boundary information is more suitable in implementing incremental innovation, as it does not involve extensive new ideas or knowledge (Dewar & Dutton 1986; Benner & Tushman 2003). The formal procedure helps managers and employees to understand and develop the knowledge and experience to add value to their existing products and processes. Moreover, this type of information acts as a code of the best practices to facilitate and accelerate the implementation of the next incremental innovation. Therefore, it is posited that:

H2: Boundary information has a positive relationship with incremental innovation.

Diagnostic control systems information is used in planning, monitoring and reporting on ongoing activities in the organization (Henri 2006; Acquaah 2013). It consists of specific measures, particularly either a benchmark or projected results to be achieved within a stated time frame (Widener 2007). The indicators act as the targeted goals for individual employees, and, subsequently, have direct performance implications for firms (Simon 1995). Since this type of information involves routine processing through comparing the actual performance with the targets, less discussion and communication between employees and managers takes place. Managers only engage in discussion with their subordinates in the event of a significant difference between them (Su et al. 2014). Through the variance report, either positive or negative, the information helps to reduce the uncertainty by realigning the undertaken activities with the organizational objectives. Negative variance indicates what occurs and allows managers to take corrective action to improve the process and product, while positive variance helps managers to strengthen on-going innovation efforts and improve the

efficiency of incremental innovation. This information provides knowledge for managers to assess whether the innovation activities are according to plan and ensure the implementation of the strategy in question (Veen-Dirks & Wijn 2002). MCS theory considers the diagnostic system as being the negative control as the information focuses solely on the variance indicators, and, hence, learning activities and creative ideas are not given attention. Such a control approach often results in a lack of motivation for managers and employees to communicate and discuss the situation. Accordingly, it is argued that, as the cost of the time taken for discussion is rather high (Sakka et al. 2013), discussion only happens if there is an exceptionally significant difference between the actual and targeted performance. Consistent with this rationale, the following hypothesis is posited:

H3: Diagnostic information has a positive relationship with incremental innovation.

Interactive control systems information promotes organization innovation activities as employees are encouraged to seek new opportunities, foresight and learning (Bisbe & Otley 2004; Henri 2006; Widener 2007; Su et al. 2014). Interactive systems increase the capacity to process information and encourage active interaction because the managers are involved in the discussions and decisions of subordinate employees (Henri 2006; Simon 1995). Furthermore, ongoing dialogue and exchange opinions help managers and employees to critically evaluate their achievements in terms of the quality, productivity, efficiency, and effectiveness of any new product being produced (Koufteros et al. 2014). The use of information interactively generates useful information to assist the learning process through the discussion from all levels in view of the technical aspects of the market, competitors and customers, instead of focusing on set of narrow measures (Veen-Dirks & Wijn 2002; Agostini et al. 2016). Additionally, active communication and continuous debate can provide a guide to identify new ideas for developing products, in addition to looking at new initiatives for providing products that meet the latest requirements of customers.

MCS interactive information plays a key role in promoting a firm's innovation activities (Bisbe & Otley 2004). Significant empirical studies have proven that there is a positive relationship between the use of interactive information and radical and incremental innovation. This positive relationship is based on the argument that the use of information can interactively create active communication among the organizational members (Henri 2006). Informal and personal dialogue among managers and employees creates an environment of willingness to exchange views and knowledge. Accordingly, Ylinen and Gullkvist (2014) emphasize that such an organizational culture is a catalyst for innovation. Sakka et al. (2013) reported that the use of an interactive project report is significantly pertinent in managing high uncertainty tasks as these activities involve a huge amount of cost and financial resources and a short decision time. Through interactive communication in formal and informal meetings, appropriate decisions can be identified in a shorter time frame. Regular discussions between managers and workers will gather outside information in detail and create a lot of new knowledge that is the basis for the implementation of high uncertainty innovation, such as radical innovation (Benner & Tushman 2003; Naranjo-Valencia et al. 2017). The interactive information also processes and provides additional information, including information pertaining to a firm's strategic uncertainty, which comprises the external uncertainties that could threaten the current business strategy (Simons 1995). Continuous discussions will create knowledge sharing activities that provide useful information to sustain innovations. Based on the discussion, the hypotheses are proposed as follows:

H4a: Interactive information has a positive relationship with radical innovation.

H4b: Interactive information has a positive relationship with incremental innovation.

INNOVATION PERFORMANCE

The significance of innovation in business processes today demands attention, specifically on innovation performance. Indeed, innovation performance is seen as being a leading factor in firm's greater performance (Calantone et al. 2010; Coad & Rao 2008; Löfsten 2014). Forés and Camisón (2016) described innovation performance in terms of the effect that specific knowledge and activities have on the innovation outputs. It guides and evaluates the innovation performance undertaken. Most literature measures innovation performance through two major dimensions; namely, effectiveness and efficiency (Alegre et al. 2006; Abu Bakar & Ahmad 2010; Calisir et al. 2013). This is because innovation activities involve various stages starting from technical design, research and development (R&D), manufacturing, and, finally, marketing management for the new or improved product value. Based on these processes, two key elements that should be considered during the product development are the efforts to achieve the successful implementation of the product (efficiency) and the success of products on the market (effectiveness). Efficient innovation performance can be measured by the average product development time period, the average number of hours worked for the implementation of new products, and the average total cost for product innovation (Ancona & Caldwell 1990; Barczak 1995). While effectiveness demonstrates the novelty of new products made in the marketplace compared to competitors, which can be assessed based on the size of new markets, extension of the product range, and the replacement of discontinued products (Wagner 2010).

Obviously, all innovation efforts are with the intention of ensuring future business success. Radical innovation involves a high degree of change, and requires greater effort to process information and gain a lot of new knowledge. These efforts subsequently lead to good profit and competitive advantage (Griffin 1997). Incremental innovation, on the other hand, improves the existing knowledge, which has less impact on the market but is still profitable (Menguc & AUH 2008; Calantone et al. 2010). Empirical evidence (Cooper & Kleinschmidt 1986; Storey & Easingwood 1998; Ylinnen & Gullkvist 2014) indicates that the implementation of innovation, either incremental or radical, will have a positive effect on the organizational innovation performance. Hence, it is expected that:

H5a: Radical innovation has a positive relationship with innovation performance.

H5b: Incremental innovation has a positive relationship with innovation performance.

MCS INFORMATION, INNOVATION AND INNOVATION PERFORMANCE

Most importantly, the information needs to be communicated to the employees for them to transform the firm's vision and mission into results. Focusing on the firm's innovation effort, such information processing activities enable managers to pursue their innovation activities and make better decisions, as well as monitor, control and motivate the employees' commitment and manage the uncertainty. However, the different types of information may lead to the implementation of different innovations (i.e. radical or incremental). If managers prioritize the use of structured information, particularly boundary and diagnostic information, most likely, incremental innovation will be pursued as the managers' focus on achieving the targeted pre-plan objectives, and the processing of information. Jansen et al. (2006) stated that mechanistic control aims to improve product and process stages, such as the implementation of incremental innovation, while organic information (interactive and belief information) promotes the implementation of innovation, namely, incremental and radical. Both formal and informal communication with the free flow of information is necessary to reduce the level of uncertainty surrounding the innovation activities, especially for radical innovation. Incremental innovation may also require organic information for longer term objectives. Obviously, managers need to use MCS information (mechanistic or organic) because each type of information has different information processing capabilities to manage uncertainty. Accordingly, this leads to the following hypotheses:

H6a: Radical innovation mediates the relationship between belief information and innovation performance.

H6b: Radical innovation mediates the relationship between interactive information and innovation performance.

H7a: Incremental innovation mediates the relationship between belief information and innovation performance.

H7b: Incremental innovation mediates the relationship between boundary information and innovation performance.

H7c: Incremental innovation mediates the relationship between diagnostic information and innovation performance.

H7d: Incremental innovation mediates the relationship between interactive information and innovation performance

Accordingly, the proposed research framework is as follows:

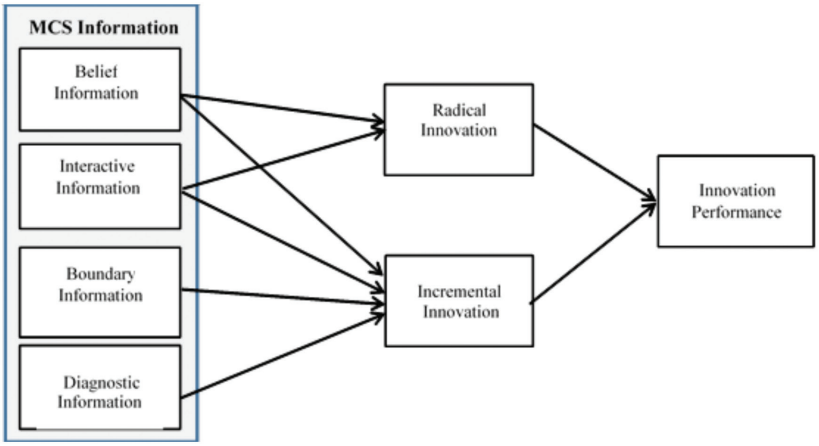

FIGURE 1. Theoretical Framework

RESEARCH METHOD

The sampling frame for this study was manufacturing firms operating in Malaysia that were registered with the Federation of Malaysian Manufacturers (FMM). The reason for choosing the manufacturing industry was due to the increasing attention on innovation activities as innovation is considered to be a key sustainability business agenda (Dangelico et al. 2017; Shahin et al. 2017). The data were collected by administering a mail questionnaire survey to, randomly selected from a total of 2500 listed in the FMM directory, with a targeted sample size of 350 (Krejcie & Morgan 1970).The product development managers were preferred since they have greater knowledge concerning the development of the innovation effort in the firms. Based on a sample of 800 manufacturing firms, 102 usable questionnaires were received with a response rate of 12.8%. It should be noted that the low response rate for academic mail surveys is a common pattern in Malaysia (Jusoh et al. 2007). Table 1 provides the detailed profile of the responding firms of which 89% have been in business for more than 10 years. Although firms regardless of size acknowledge that innovation is a pertinent in today's business activity (Rosli & Sidek 2013), approximately 70% of the respondents were large size firms having more than 200 employees with annual sales of more than RM25 million. Time-trend exploitation approach was undertaken to assess for potential non-response bias. By using an independent-samples t-test, the contrast between the early and late respondents showed no significant variances in their variable responses.

TABLE 1. Profile of the Firms

	Frequency N=102	%
Manufacturing industry		
Electrical and Electronics	25	24.5
Engineering supporting	6	5.9
Life science	11	10.8
Rubber products	7	6.9
Machinery and equipment	5	4.9
Food processing	8	7.8
Petrochemical and polymer	7	6.9
Wood based	5	4.9
Textiles and apparel	2	2.0
Transportation equipment	4	3.9
Basic and metal products	8	7.8
Others	14	13.7
Total number of employees		
Below 100	14	13.7
Between 100-200	16	15.7
Between 201-500	49	47.9
Between 501-1000	8	7.8
1001 and above	15	14.7
Annual sales		
< RM10,000,000	13	12.7
RM10,000,001 - RM25,000,000	21	20.6
RM 25,000,001 - RM 100,000,000	28	27.5
RM 100,000,001 - RM 300,000,000	9	8.8
RM 300,000,001 - RM 500,000,000	9	8.8
Above RM 500,000,000	2	21.6
Firm Age		
Below 5 years	3	2.9
Between 5 and 10 years	8	7.8
Between 11 and 20 years	23	22.5
Between 21 and 30 years	40	39.2
Above 30 years	28	27.5
Respondents		
Top management	40	39.2
Middle management	54	52.9
First level management	8	7.8

MEASUREMENT OF VARIABLES

MCS information was measured using the Simons' (1995) LOC framework consisting of belief, boundary, diagnostic and interactive. Belief inspires the workforce to take desired actions, was measured using six questions to assess the extent that the mission statement communicates the organizational core values based on the instruments of Widener (2007), and Hoonsopon and Reunom (2012). Boundary control, which indicates the use of a code of business conduct and systems state areas/actions that should be avoided and also diagnostic information, was measured using Widener (2007). Another ten questions specifically asked the use of information generated through the involvement of top and/or operating managers interactively taken from the measurements of Widener (2007) and Van der Stede (2001). All the items were modified to measure the use of MCS information using a seven-point Likert scale; one indicated not at all, while seven indicated to a very great extent. All items were loaded successfully except for three interactive items were dropped due to low factor loading.

Radical and *incremental innovations* were measured using a twelve-item instrument originally developed by Jansen et al. (2006) which has been revised, modified and used by Ylinen and Guiilvist (2014). The respondents were asked to indicate on a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree) the extent to which particular characteristics described the innovation activities in their firms.

Innovation performance was measured using an instrument developed by the Organization for Economic Cooperation and Development (OECD 2005). The instrument has been used in a number of empirical studies, such as Algree et al. (2006), Algree and Chiva (2013), and Calisir et al. (2013). The respondents were asked to rate on a seven-point scale their firms' innovation performance relative to their competitors for the past three years. Bisbe and Otley (2004) underlined that the three years duration is necessary to observe a consistent effort towards innovation. There were twenty-four questions about the effectiveness and

efficiency of innovation performance, in which 1 was labelled as much worse than competitors, while 7 indicated much better than competitors.

Detail of the factor loadings and Cronbach Alphas are presented in subsequent section.

Results

The descriptive statistics for the variables in this study are presented in Table 2. In general, the statistics show that the MCS information components have means greater than 3.5 indicating that the distribution of scores was skewed towards agreement. The scales, which ranged from strongly disagree to strongly agree, signify the implementation of innovation effort among the manufacturers. However, there was a difference in the degree of innovation in which incremental innovation is more common to the firms compared to radical innovation. In spite of the variation between the degrees of innovation, both innovations are positively associated with innovation performance.

The hypotheses were tested using the partial least squares (PLS) method for structural equation model estimation SEM. Using SmartPLS software version 3.00, the data for this study were analysed. Prior to assessing the quality of the measurement model. Table 3 reflects good convergent reliability, because all items loaded to their respective constructs are almost equivalent or exceeded the recommended value of 0.70 (Hair et al. 2014). Discriminant validity can be assessed using Fornell-Larcker criterion approach. Particularly, the square root of each construct's AVE ought to be greater than its highest correlation with any other construct, the individual item reliability, construct reliability, and convergent and discriminant validity of each parameter were validated. Individual item reliability is considered adequate when an item has a factor loading that is greater than 0.71 on its respective construct. Most items suggest good indicator reliability except for eight out of 23 items on innovation performance that were dropped. These items were observing the implication on the product market share. The results of the measurement model for the full sample are summarized in Tables 3 and 4.

Hypotheses Testing

Test of H1 to H4: MCS Information and innovation. H1a and H1b predicted that belief information has a direct effect on the innovation activities. The significant path shown in Table 5 signifies the importance of the belief type of information in creating a positive environment promoting creativity and innovation. For radical innovation, interactive information is also important to facilitate the innovation effort, since H4a is supported. In determining the necessary information to support incremental innovation, besides belief information, diagnostic is important, and, therefore, H3 is supported. There is no significant evidence to associate the use of boundary and interactive types of MCS information with incremental innovation as hypothesized.

Test of H5: Innovation and Innovation Performance. Subsequently, both H5a and H5b predicted that innovation leads to good innovation performance. Consistent with the observation of Ylinen and Guiilvist (2014), there are significant direct relationships between radical innovation and innovation performance, and incremental innovation and performance. The analysis, as depicted in Table 5, provides evidence that both types of innovation are significantly related to performance. H5a stated that radical innovation is positively related to innovation performance. The significant positive relationship between radical innovation and innovation performance (β=0.534, $p<0.01$) provides support for H5a. Whilst for the earlier expectation that incremental innovation should also be positively associated with innovation performance, but at a slightly lower degree than radical innovation, the analysis is somewhat similar to Calantone et al. (2010), as incremental innovation is also positively and significantly (β=0.234, $p<0.10$) related to the innovation performance. Therefore, H5b is not supported.

Test of H6 and H7: MCS information and Innovation Performance through innovation. H6 is supported as significant paths are shown in Table 6. The relationships signify the importance of both belief and interactive information to facilitate radical innovation, and,

TABLE 2. Descriptive Statistics

	Items	Theoretical range	Actual range	Mean	Standard Deviation
MCS					
Belief information	6	1-7	2.00-7.00	5.21	0.939
Boundary information	4	1-7	3.00-7.00	5.39	0.927
Diagnostic information	10	1-7	2.00-7.00	4.96	0.996
Interactive information	7	1-7	2.00-7.00	4.66	0.856
Radical Innovation	6	1-7	1.00-7.00	4.80	1.183
Incremental Innovation	6	1-7	2.00-7.00	5.28	0.957
Innovation Performance	15	1-7	1.00-6.00	4.66	0.918

TABLE 3. Summary of Estimation Measurement Model Parameters

	Factor loading	AVE	CR	Cronbach Alpha
MCS Information				
Belief Information		0.737	0.944	0.932
Workforce aware of core value	0.913			
Clear vision about the new product	0.876			
Top managers communicate core values	0.863			
Mission statement inspire workforce	0.870			
Mission statement communicates the firm's core	0.845			
Clear understanding about targeted customers	0.779			
Boundary Information		0.787	0.936	0.910
Code of conduct sets limit	0.911			
Workforce aware of code of conduct	0.901			
Code of conduct defines appropriate behaviour	0.890			
Firm communicates risks to be avoided	0.845			
Diagnostic Information		0.737	0.933	0.963
Monitor innovation results	0.909			
Report the corrective actions	0.889			
Compare innovation outcomes	0.883			
Provide a common view	0.883			
Tie the organization together	0.880			
Focus on common issues	0.856			
Review key measures	0.843			
Track progress of innovation activities	0.828			
Focus on critical success factors	0.805			
Develop a common vocabulary	0.802			
Interactive Information		0.830	0.951	0.940
Enable continuous discussion	0.913			
Enable discussion	0.898			
Interprets innovation performance	0.894			
Pays day-to-day attention to innovation activities	0.840			
Frequent involvement with the innovation decision	0.839			
Enable continual challenge	0.857			
Emphasis on the free flow of information	0.745			
Frequent involvement with the innovation decision	0.839			
Innovation				
Radical Innovation		0.711	0.936	0.916
Commercialize completely new product	0.931			
Utilize new opportunities in new markets	0.900			
Search for new clients in new markets	0.841			
Use new distribution channels	0.801			
Go beyond existing products	0.798			
Experiment with new products	0.778			
Incremental Innovation		0.709	0.936	0.920
Improve product efficiency	0.880			
Implement small adaptations to existing product	0.873			
Expand products for existing clients	0.847			
Refine the existing products	0.823			
Increase economies of scales	0.818			
Improve existing products	0.807			

continue

Continued TABLE 3.

	Factor loading	AVE	CR	Cronbach Alpha
Innovation Performance		0.697	0.972	0.970
Cutting production cycle	0.900			
Creation of a new product or a new component)	0.894			
Improvement of labour conditions	0.886			
Cutting energy consumption	0.871			
Cutting design costs	0.867			
Improvement of product quality	0.866			
Improvement of production flexibility	0.858			
Average cost per innovation project	0.856			
Reduction of environmental damage	0.843			
Cutting labour cost per unit	0.828			
Cutting material consumption	0.810			
Average working hours	0.777			
Cutting rejected production rate	0.762			
Being the first in the market	0.762			
Innovation projects efficiency	0.715			

TABLE 4. Discriminant Validity Coefficients

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Belief information	.86						
Boundary information	.72**	**.89**					
Diagnostic information	.74**	.77**	**.86**				
Interactive information	.57**	.61**	.73**	**.91**			
Radical Innovation	.67**	.55**	.73**	.59**	**.84**		
Incremental innovation	.62**	.64**	.71**	.45**	.80**	**.84**	
Innovation performance	.63**	.56**	.73**	.51**	.74**	.73**	**.84**

The square root of the AVE value for each of the constructs along the diagonal (in bold)
** p < 0.01 (two-tailed test)

TABLE 5. Results of H1 to H5

	Path Model	B	t value	Result
H1a	Belief -> Radical	0.459***	4.127	Supported
H1b	Belief -> Incremental	0.262**	2.939	Supported
H2	Boundary -> Incremental	0.084	0.633	Not supported
H3	Diagnostic-> Incremental	0.404**	3.015	Supported
H4a	Interactive -> Radical	0.276***	2.466	Supported
H4b	Interactive-> Incremental	0.056	0.289	Not supported
H5a	Radical -> Performance	0.534***	4.118	Supported
H5b	Incremental-> Performance		2.739	Supported

* p< 0.1 (two-tailed test); ** p<0.05 (two-tailed test); *** p<0.01(two-tailed test

TABLE 6. Results of H6 and H7

	Path Model	t value	p value	Result
H6a	Belief -> Radical-> Innovation Performance	2.915	0.00	Supported
H6b	Interactive -> Radical-> Innovation Performance	2.111	0.03	Supported
H7a	Belief -> Incremental-> Innovation Performance	2.001	0.04	Supported
H7b	Boundary -> Incremental-> Innovation Performance	0.616	0.53	Not supported
H7c	Diagnostic-> Incremental-> Innovation Performance	2.025	0.05	Supported
H7d	Interactive-> Incremental-> Innovation Performance	0.287	0.77	Not supported

subsequently, positively related to performance. Coinciding with the earlier findings only H7a and H7c are supported, whereas no significant result to support the role of boundary and interactive information, and incremental innovation.

Discussion

The findings demonstrate the use of belief information in creating the working environment that appreciates creative ideas. Consistent with Grochels (2012) and Hoonsopon and Ruenrom (2012), such information provides confidence and autonomy for employees to innovate aligned with the strategic direction of the firms. However, no significant role of boundary information and incremental innovation reported and thus H2 is not supported. This suggests that regulations and formal procedures do not promote incremental creativity among Malaysian manufactures, similar to Ylinen and Gullkvist (2014) that claimed project boundaries deter innovativeness. Diagnostic type of information as being hypothesized facilitates incremental innovation being as means to monitor and guide the undertaken activity. Indeed, Sakka et al (2013) assert that such approach is only suitable for tasks with clear outcomes. Conversely, radical innovation need interactive information which informal communication and active interaction facilitate learning process among employees to cope with the uncertainty and risk enfolding radical changes. But, it may not fit for incremental improvement. Sakka et al (2013) point out that given lower uncertainty level of incremental innovation, use of interactive information is somewhat expensive, which explains the unsupported H4a. Obviously, the innovation commitment leads greater innovation performance. The findings thus provide support on Organizational Information Processing theory underlining firms, which use information in structurally manner, enable them to perform better. Consecutively, H6 and H7 confirm earlier results whereby significant relationship between MCS information and innovation enhance firms' innovation performance, consistent with prior findings of Ylinen and Gullkvist (2014), Hoonsopon and Ruenrom (2012) and Jansen et al. (2006).

Taken as a whole, the findings indicate that the MCS information is important to encourage firms to embark on innovation activities. Although radical and incremental innovation are subjected to different levels of risk, the belief type of information remains relevant as it sets the mission, vision and working culture to undertake the challenge. Accordingly, the degree of uncertainty associated with the different types of innovation is reflected in terms of management style, as radical innovation requires interactive communication, while incremental needs diagnostic information.

Conclusion

The study provides recommendations to tackle the challenge to embark on innovation activities in the Malaysian manufacturing industry. Both radical and incremental innovations are important for firm to sustain. Yet, the structure and support system within the organization is important to instil the value and facilitate the innovative effort among the manufacturers. The use of information generated using management control information drives their innovation journey. Evidently, the MCS information used and generated through the levers of control correlates with use of information and innovations, and, subsequently, both radical and incremental innovations were correlated with innovation performance. Besides the direct effect of using MCS information on innovation, the study also examined the indirect relationship between information and innovation performance through radical innovation and incremental innovation as mediator variables. Four types of information – belief system (vision and mission) boundary (rules, formal procedures and business ethics codes) diagnostic and interactive – were tested against the degree of innovation involvement. Management should take note of the right type of information to match with the expected degree of newness. While interactive information is appropriate for radical innovation, diagnostic information is more suitable for incremental innovation. Most importantly, the belief towards innovation need to be inculcated in the firms through their vision and mission in order to inspire organization members to commit and work together towards the path, irrespective of whether it is a radical or incremental improvement. Accordingly, the information plays a role in enhancing innovation performance as the match between the right type of information and the degree of innovation subsequently leads to better innovation performance. In summary, these findings demonstrated that pertinence of information to support Malaysian manufactures innovation activities as the information produces relevant, timely and sufficient knowledge in dealing with different levels of innovation uncertainty. However, the results should be interpreted in light of several limitations. First, the study suffered from all the limitations inherent in using a cross-sectional research design in which the data is a snapshot of the firms' practices in a dynamic environment. A single empirical study, such as this, in any case, could not be viewed as conclusive. Hence, the study should be part of a larger empirical longitudinal investigation to enhance the understanding of innovation practices among manufacturing firms. Second, the objective to observe the implementation of innovation among the manufacturers on a broad scale limits the ability to explore in depth. To enhance the understanding, further investigation could be undertaken in light of the study's preliminary findings. It is thought that the findings of this study would have a higher degree of confidence if the sample size was larger. A larger sample size would result in more reliable findings and allow the sample to be categorized and analysed according to a particular industry sector. Next, the questions are based on perceptions. Thus, the responses may represent what the respondents perceived to be the fact rather than the actual fact. The final limitation is the low response rate, which limits the

statistical power of the results and application of more advanced statistical techniques. However, the credibility of the findings can be scrutinised in future research.

REFERENCES

Abu Bakar, L.J & Ahmad, H. 2010. Assesing the relationship between firm resources and product innovation performance. *Business Process Management Journal* 16(3): 420-435.

Acquaah, M. 2013. Management control systems, business strategy and performance: A comparative analysis of family and non-family businesses in a transition economy in sub-Saharan Africa. *Journal of Family Business Strategy* 4(2): 131-146.

Agostini, L., Filippini, R. & Nosella, A. 2016. Users and radical innovation performance: the moderating role of the organisational context. *Technology Analysis & Strategic Management* 28(8): 798-810

Akroyd, C. & Maguire, W. 2011. The roles of management control in a product development setting. *Qualitative Research in Accounting and Management* 8(3): 212-237.

Alegre, J. & Chiva, R. 2013. Linking entrepreneurial orientation and firm performance: The role of organizational learning capability and innovation performance. *Journal of Small Business Management* 54(4): 491-507.

Alegre, J., Lapiedra, R. & Chiva, R. 2006. A measurement scale for product innovation performance. *European Journal of Innovation Management* 9(4): 333-346.

Al-Sayed, M. & Dugdale, D. 2016. Activity-based innovations in the UK manufacturing sector: Extent, adoption process patterns and contingency factors. *The British Accounting Review* 48(1): 38-58.

Amabile, T.M. 1998. How to kill creativity. *Harvard Business Review* (September/October): 77-87.

Anthony, R.N. & Govindarajan, V. 2007. *Management Control Systems*. Twelfth Edition. New York: McGraw Hill.

Ancona, D.G. & Caldwell, D.F. 1990. Beyond boundary spanning: managing external dependence in product development teams. *Journal of High Technology Management* 1(1): 119-135.

Barczak, G. 1995. New product strategy, structure, process, and performance in the telecommunications industry. *Journal of Product Innovation Management* 12(4): 224-34.

Benner, M.J. & Tushman, M.L. 2003. Exploitation, exploration and process management: The productivity dilemma revisited. *Academy of Management Review* 28(2): 238-256.

Bisbe, J. & Otley, D. 2004. The effects of interactive use of management control systems on product innovation. *Accounting, Organizations and Society* 29: 709-737.

Brentani, U. 2001. Innovative versus incremental new business services: Different keys for achieving success. *Journal of Product Innovation Management* 18(3): 169-187.

Brentani, U. & Kleinschmidt, E.J. 2004. Corporate culture and commitment: Impact on performance of International new product development programs. *Journal of Product Innovation Management* 21(5): 309-333.

Brown, S.L. & Eisenhardt, K.M. 1995.Product development: Past research, present findings and future directions. *Academy of Management Review* 20(2): 343-378.

Busco, C., Giovannoni, E. & Scapens, R.W. 2008. Managing the tensions in integrating global organisations: The role of performance measurement systems. *Management Accounting Research* 19(2): 103-125.

Calantone, R.J., Harmancioglu, N. & Droge, C. 2010. Inconclusive innovation "returns" a meta-analysis of research on innovation in new product development. *Journal of Product Innovation Management* (27): 1065-1081.

Calisir, F., Gumussoy, C.A. & Guzelsoy, E. 2013. Impacts of learning orientation on product innovation performance. *The Learning Organization* 20(3): 176-194.

Chenhall, R.H. 2003. Management control systems design within its organizational context: Findings from contingency-based research and directions for the future. *Accounting, Organizations and Society* 28: 127-168.

Coad, A. & Rao, R 2008. Innovation and firm growth in high-tech sectors: a quartile regression approach. *Research Policy* 37(3): 192-209.

Cooper, R.G. & Kleinschmidt, E.J. 1986. An investigation into the new product process: Steps, deficiencies, and impact. *Journal of Production Innovation Management* 3(2): 71-85.

Daft, R.L. & Macintosh, N.B. 1978. A new approach to design and use of management information. *California Management Review* 21(1): 82-92.

Damanpour, F. 1987. The adoption of technological, administrative, and ancillary innovations: impact of organizational factors. *Journal of Management Winter* 13(4): 675-688.

Damanpour, F. & Evan, W.M. 1984. Organisational innovation and performance: the problem of "organisational lag". *Administrative Science Quarterly* 29(3): 392-409.

Dangelico, R.M, Pujari, D & Pontrandolfo, P. 2017. Green product innovation in manufacturing firms: Sustainability oriented dynamic capability perspective. *Business Strategy and the Environment* 26: 490-406.

Davila, T. 2000. An empirical study on the drivers of management control systems design in new product development. *Accounting, Organizations and Society* 25: 383-409.

Dewar, R.D. & Dutton, J.E. 1986. The adoption of radical and incremental innovations: an empirical analysis. *Management Science* 32(11): 1422-1433.

Edison, H., Nauman, A. & Torkar, R. 2013. Towards innovation measurement in the software industry. *The Journal of Systems and Software* 86: 1390-1407.

El-Namaki, M.S.S. 1992. Creating a corporate vision. *Long Range Planning* 25: 25-29.

Eshraqi, S. 2012. Innovation and using management control system. *International Proceeding of Economic and Development Research* 52(1): 1-6. http://www.ipedr.com/list-78-1.html (Accessed on 20 June 2015).

Ettlie, J.E. & Reza, E.M. 1992. Organizational integration and process innovation. *Academy of Management* 35: 795-827.

Ewusi-Mensah, K. 1981.The external organizational environment and its impact on management information system. *Accounting, Organizations and Society* 6(4): 301-316.

Ferlito, C. Feb 13, 2017. Innovation, Growth and Incentives: The Malaysian Example', Forbes. http://www.forbes.com/sites / real spin/2017/02/13/innovation-growth-and-incentives-the-malaysian-example/ (accessed on 25 April 2017).

Frow, N., Marginson, D. & Ogden, S. 2010. Continuous budgeting: Reconciling budget flexibility with budgetary control. *Accounting, Organizations and Society* 35: 444-461.

Forés, C. & Camisón, B. 2016. Does incremental and radical innovation performance depend on different types of knowledge accumulation capabilities and organizational size. *Journal of Business Research* 69(2): 831-848.

Faizuniah, P. & Aizzat M.N. 2019. Assessing the relationship between organisational commitment and knowledge sharing behaviour. *Malaysian Management Journal* 13 (1&2): 35-50.

Galbraith, J. 1974. Organization Design: An Information Processing View. *Interfaces* 4(3): 28-36.

Giffin A. 1997. PDMA Research on new product development practices: Updating trends and benchmarking best practices. *Journal of Product Innovation Management* 14: 429-58.

Global Innovation Index 2019. Cornell School of Business. https://www.globalinnovationindex.org/gii-2019-report (Accessed on 3 October 2019).

Grochels, L. 2012. *Business Model Renewal*. Singapore: McGraw-Hill.

Gunaselan Letchemenan. 2006. Organization determinants of incremental and radical innovations in industries operating in Malaysia, Unpublished dissertation, University of Science, Malaysia Science.

Hair, J.F., William, C., Babin, B.J. & Anderson, R.E. 2014. *Multivariate Data Analysis*. London: Pearson Education Limited.

Hausman, A. & Johnston, W.J. 2014. The role of innovation in driving the economy: the lesson from the global financial crisis. *Journal of Business Research* 67(1): 2720-2726.

Henri, J.F. 2006. Management control systems and strategy: A resource-based perspective. *Accounting, Organizations and Society* 31: 529-558.

Hess, E. 2014. Why is innovation so hard? *Entrepreneurs* Aug 4: 72-79.

Hoonsopon, D. & Ruenrom, G. 2012. The impact of organizational capabilities on the development of radical and incremental product innovation and product innovation performance. *Journal of Managerial Issues* 3: 250–276.

Jansen, J.J.P., Van den Bosch, F.A.J. & Volberda, H.W. 2006. Exploratory Innovation, Exploitative Innovation, and Performance: Effects of Organizational Antecedents and Environmental Moderators. *ERIM Report Series Research in Management* 6(3): 20-32.

Johnson, G., Scholes, K. & Whittington, R. 2005. *Exploring Corporate Strategy: Text and Cases*. Seventh Edition. Singapore: Prentice-Hall Financial Times, Pearson Education Limited.

Jusoh, R., Ibrahim, D.N. & Zainuddin, Y. 2007. The performance consequence of multiple performance measures usage: Evidence from the Malaysian manufacturers. *International Journal of Productivity and Performance Management* 57(2): 119-136.

Knight, K.E. 1967. A Descriptive Model of the Intra-Firm Innovation Process. *The Journal of Business* 40(4): 478-496.

Koufteros, X., Verghese, A. J., & Lucianetti, L. 2014. The effect of performance measurement systems on firm performance: A cross-sectional and a longitudinal study. *Journal of Operations Management* 32(6): 313-336.

Krejcie, R.V. & Morgan, D.W. 1970. Determining sample size for research activities. *Educational and Psychological Measurement* 30(3): 607-610.

Langfield-Smith, K. 2007. A review of quantitative research in management control systems and strategy In *The Handbook of Management Accounting Research*, edited by C. Chapman, A. Hopwood & M. Shield. 753-784. Oxford, UK: Elsevier Press.

Larwood, L., Falbe, C.M., Kjiger, M.P. & Miesing, P. 1995. Structure and Meaning of Organizational Vision. *Academy of Management Journal* 38: 740-769

Lawson, B. & Samson, D. 2001. Developing innovation capability in organisations: a dynamic capabilities approach. *International Journal of Innovation Management* 5(3): 377-40.

Lee, C. 2004. The determinants of innovation in the Malaysian manufacturing sector: An econometric analysis at the firm level. *ASEAN Economic Bulletin* 21(3): 319-329.

Lievens, A. & Moanert, R.K. 2000. Communication flows during financial service innovation. *European Journal of Marketing* 34(9/10): 1078-110.

Löfsten, H. 2014. Product innovation processes and the trade-off between product innovation performance and business performance. *European Journal of Innovation Management* 17(1): 61-84.

Lukas, B.A. & Ferrell, O.C. 2000. The effect of market orientation on product innovation. *Academy of Marketing Science Journal* 28(2): 239-247.

Marginson, D.E.W. 2002. Management control systems and their effects on strategy formation at middle-management levels: Evidence from a UK organization. *Strategic* 23(11): 1019-1031.

Martyn, P., Sweeney, B. & Curtis, E. 2016. Strategy and control: 25 years of empirical use of Simons Levers of Control framework. *Journal of Accounting & Organizational Change* 12(3): 281-324.

Menguc, B. & AUH, S. 2008. The asymmetric moderating role of market orientation on the ambidexterity–firm performance relationship for prospectors and defenders. *Industrial Marketing Management* 37: 455–470.

Mundy, J. & Arjalies, D. 2013. The use of management control systems to manage CSR strategy: A levers of control perspective. *Management Accounting Research* 24(4): 284-300.

Naranjo-Valencia, J.C., Jimenez-Jimenez, D. & Sanz-Valle, J.R. 2017. Organizational culture and radical innovation: Does innovative behavior mediate this relationship? *Creativity and Innovation Management* 26(4): 407-417.

Otley, D. 1999. Performance management: A framework for management control system research. *Management Accounting Research* 10(4): 363-382.

Pawanchik, Azim, Sulaiman, Suraya & Zahari, Aina. 2011. National Innovation Strategy Study, Stimulating Innovation among Large Firms in Malaysia: Strategy and Policy Recommendations. Commissioned by: Special Innovation Unit, Prime Minister's Office.

Rezania, D., Baker, R. & Burga, R. 2016. Project control: an exploratory study of levers of control in the context of managing projects. *Journal of Accounting & Organizational Change* 12(4): 614-635.

Rosli M.M. & Sidek, S. 2013. The Impact of Innovation on the Performance of Small and medium Manufacturing Enterprises: Evidence from Malaysia. *Journal of Innovation Management in Small & Medium Enterprise* 2013: 1-16.

Sakka, O., Barki, H. & Cote, L. 2013. Interactive and diagnostic uses of management control systems in IS projects: Antecedents and their impact on performance. *Information and Management* 50(6): 265-274.

Simons, R. 1995. Levers of control: How managers use innovative control systems to drive strategic renewal. Harvard Business School Press.

Shahin, A., Barati, A., Dabestani, R. & Khalili, A. 2017. Determining factors influencing radical and incremental innovation with a case study in the petrochemical industry. *International Journal of Business Innovation and Research* 12(1): 621-79.

Storey, C. & Easingwood, C. J. 1998. The augmented service offering: a conceptualization and study of its impact on new

service success. *Journal of Product Innovation Management* 15: 335-351.

Su, S., Baird, K. & Schoch, H. 2014. The moderating effect of organisational life cycle stages on the association between the interactive and diagnostic approaches to using controls with organisational performance. *Management Accounting Research* 26: 40-53.

Thompson, V.A. 1965. Bureaucracy and Innovation. *Administrative Science Quarterly* 10(1): 1-20.

Tushman, M. L., Anderson, P.C. & O'reilly, C. 1997. Technology Cycles, Innovation Streams and Ambidextrous Organizations. In *Managing Strategic Innovation and Change*. New York: Oxford University Press.

Tushman, M.L. & Nadler, D.A. 1978. Information processing as an integrating concept in organizational design. *The Academy of Management Review* 3(3): 613-624.

Utterback, J.M. 1971. The process of technological innovation within the firm. *Academy of Management Journal* 14(1): 75-88.

Van de Ven, A.H. 1986. Central Problems in the Management of Innovation. *Management Science* 32(5): 590-607.

Van der Stede, W. A. 2001. Measuring tight budgetary control. *Management Accounting Research* 12: 119-137.

Veen-dirks, P. & Wijn, M. 2002. Strategic Control: Meshing Critical Success Factors with the Balanced Scorecard. *Long Range Planning* 35: 407-427.

Wagner, S.M. 2010. Supplier traits for better customer firm innovation performance. Institute for the Study of Business Market Working Paper Series. The Pennsylvania State University, 15 April.

Wan Suhazeli Wan Ahamed, Mahmoud Khalid Almsafir & Arkan Walid Al-Smadi 2014. Does Corporate Social Responsibility Lead to Improve in Firm Financial Performance? Evidence from Malaysia. *International Journal of Economics and Finance* 6(3): 126-138.

Widener, S.K. 2007. An empirical analysis of the levers of control framework. *Accounting, Organizations and Society* 32: 757-788.

Wijethilake, C. Munir, R. & Ranjith, A. 2018. Environmental innovation strategy and organizational performance: enabling and controlling uses of management control systems. *Journal of Business Ethics* 151: 1139-1160.

Wu, I. & Chiu, M. 2015. Organizational applications of IT innovation and firm's competitive performance: A resource-based view and the innovation diffusion approach. *Journal of Engineering and Technology Management* 35(1): 25-44.

Ylinen, M. & Gullkvist, B. 2014. The effects of organic and mechanistic control in exploratory and exploitative innovations. *Management Accounting Research* 25(1): 99-122.

Zahra, S.A. & Das, S.R. 1993. Innovation strategy and financial performance in manufacturing companies: an empirical study. *Product and Operations Management* 2(1): 90-101.

Salma Khalidah Sa'adon
Fakulti Ekonomi dan Pengurusan
Universiti Kebangsaan Malaysia
43600 UKM Bangi Selangor
MALAYSIA
E-mail: sks_khalidah@yahoo.com

Amizawati Mohd Amir*
Fakulti Ekonomi dan Pengurusan
Universiti Kebangsaan Malaysia
43600 UKM Bangi Selangor
MALAYSIA
E-mail: amiza@ukm.edu.my

Rozita Amiruddin
Fakulti Ekonomi dan Pengurusan
Universiti Kebangsaan Malaysia
43600 UKM Bangi Selangor
MALAYSIA
E-mail: rozita@ukm.edu.my

*Corresponding author