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Effect of Enterprise Resource Planning Systems and Forms of Management Control on Firm's Competitive Advantage

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ABSTRACT

In the brick of digitalization industry revolution era, this study signifies the pertinent role of Enterprise Resource Planning Systems (ERPs) towards assisting the organization towards attaining the firm's mission and goal. This study extends the knowledge by exploring the relationship between ERPs and management control (MC), which in turn enhances firm's competitive advantage. Realizing the limited empirical work on ERPs from management accounting and control perspective, the discussion would be drawn from business stakeholder's perspective, instead of from information technology standpoint. The study views ERPs as an important resource in creating the capability to control the business operations and combination of both factors creates the firm's competitive advantage. Survey questionnaires were administered via email to 972 randomly selected manufacturing firms listed in Federation of Malaysian Manufacturer Directory. Based on the 114 usable responses, the data was analyzed using a structural equation modeling (SEM) approach through partial least square (PLS) software. The findings provide empirical evidence on the significance of ERPs in determining firm's MC approaches, both technocratic and socio-ideological forms of control. Evidently, these variables do associate positively with competitive advantage. Additionally, the analysis demonstrates that only technocratic form of MC mediates the relationship between ERPs and competitive advantage, but not for socio-ideological control. These findings provide an insight on the relationship among ERPs, form of MC and firm's competitive advantage, which may be an input for businesses in facing the industrial digitalization era.

Keywords: Enterprise Resource Planning Systems; forms of management control; technocratic control; socio-ideological control; competitive advantage

INTRODUCTION

As organizations implement Enterprise Resource Planning Systems (ERPs) as part of digitization and operations improvement, it is becoming critical for businesses to understand the benefit of the technology advancement in creating business success. Though the ERPs have been extensively discussed from the information technology standpoint, it is critically important for business units to understand the role of ERPs in facilitating and creating business success. Indeed failure of the systems in providing the right and sufficient information may cause adverse impact such as project delays, budget overruns and business disruption to the organization. For that reason, the ERPs should be seen as a process model in converting and governing the business data into useful business information (Griffin & Wright 2015). The ERPs obviously effected and reshaped fundamentally the way business data is collected, stored, integrated and used in different ways (Teittinen, Pellinen & Järvenpää 2013) that will lead to changes in management accounting given fast, easy access and real time operation data needed in managing and controlling the businesses. Having right management control (MC) approach is pertinent considering the form of control support managers in making decision (Chenhall 2003) and also to guide employee behavior in desirable ways congruent with the organization's objectives and organizational performance (Bhimani, Horngren, Datar & Foster 2008).

The implications of ERPs on businesses, particularly related to management accounting were observed in few studies (Bradford, Earp & Grabski 2014; Caglio 2003; Granlund & Malmi 2002; Spathis 2006; Spathis & Ananiadis 2005) and mostly the findings on the impact of ERPs on management accounting and control are inconclusive. In spite of the assumption on the merit of having new technology in the business, the reported outcomes have been inconsistent. This raises the question of the effect of ERPs towards managing and controlling the management actions and decisions. Scapens and Jazayri (2003) postulated that ERPs have insignificant effect on management accounting and control. On the contrary, Sánchez and Spraakman (2012) argue differently stating that ERPs implementations do affect and improve management accounting efficiency and effectiveness, yet underline the available evidence have typically been piecemeal. Related studies observe ERPs from various angles such as the changing role of accountants to be business analysts (Granlund & Malmi 2002), effect on organizational structure (Quattrone & Hopper 2005) and impact on information system (Rose & Kraemmerkaard 2006). The understanding with regards to ERPs relationship in establishing business success remains

underdeveloped (Spathis & Ananiadis, 2005; Granlund 2011; Kallunki, Laitinen & Silvola 2011; Ruivo, Oliveira & Neto 2014). Hence, the study aims to add management accounting knowledge by exploring the extent to which ERPs as business processes may determine MC approaches in establishing organizational competitive advantage.

This study contributes to management accounting literature by empirically addressing the ERPs role on MC and the impact on the Malaysian manufacturing sector's competitive advantage. Given the paucity of study involving Malaysian firms, this study fills the gap and contributes a meaningful knowledge to practitioner in sway of Industry 4.0. The remainder of the discussion is organised as follows: Next section reviews related literature and develops the hypothesized relationships. Subsequent section elaborates on the research method. Finally, the last section discusses on the results and provides the concluding remarks.

Literature Review and Hypotheses Development

Enterprise Resource Planning Systems

Historically, ERPs started as an extension of MRP system which has been extended from a simple Material Requirements Planning (MRP) in the 1980s. MRP involves a production planning, scheduling, and inventory control system needed to manage manufacturing processes. Following that MRP advanced to MRP II which was the standard manufacturing resources planning (Chung & Snyder 1999). MRP II systems started with an emphasis to optimize manufacturing process by coordinating the materials with production requirements. MRP II encompasses areas such as project management, distribution management, finance, human resource and engineering bringing in the financial accounting and the financial management system together with the manufacturing and materials management systems (Rashid, M., Hossain, L. & Patrick, J. 2002; Umble, Haft & Umble 2003). However, MRP II limitations in terms of the management of production facility orders, production plans and inventories which demand for the needs of a more integrated solution has brought to the start of ERPs (Chung & Snyder 1999). The idea of ERPs is that it manages logistical concepts from MRP and MRP II. As an alternative to using several systems in the management a company's business, ERPs serves as a tool for a company to streamline into one integrated system from what initially were traditionally separate operations.

This enables information to flow from operations to operations through common ERPs thereby creating more processes with higher efficiency, higher quality reporting, and straightforward companywide communication. Technically, the basic architecture of ERPs constitutes a database, an application and a unified interface for an entire enterprise (Al-Mashari, Al-Mudimigh & Zairi 2003). ERPs facilitate the business transactions in firms and lead to competitive advantage. The application of software allows the businesses to better manage their operations (Kharabe & Lyytinen 2012).

Sánchez-Rodríguez and Spraakman (2012) using case studies attempt to increase the understanding of ERPs adoption and its effect on management accounting. Findings showed that the amount of data entry done by management accountants had been reduced owing to the standardization and automation of transaction processing. Standardized performance measures which expanded to more unit and products resulted in increased accuracy, and increased production rate. Moreover there were more efficient and effective management accounting techniques and less involvement with data entry allowing management accountants to undertake more extensive analyses on non-financial information. The attributes of EPRs which benefits businesses are by having (a) more accurate and timely information; (b) the ease of use of information across all units and products and; (c) reduced data entry amount done by management accountant. Apparently, these attributes represent the business process undertaken in the operations. Rather than restricting firms to narrowly focused information, relying on manually connecting functional information systems which works by printing information from one system and key in it into the other systems, which may consider challenging in managing the data complexity across entire business process, ERPs introduce the concept of integrated information system. In other words, ERPs support the whole business process rather than parts of process, captures the interdependence of tasks, roles, people, departments and functions and to provide customer with a product or service in comprehensive manner (Magal & Word 2009).

Accordingly, Melan (1993) defined a business process as a bounded group of interrelated work activities which delivers output of greater value than the inputs through one or more transformation. The "input" and the "output" represent the transformations flows between activities and is typically comprised of information. Melan classified transformations from three levels namely physical, locational, transactional and informational (see Melan 1993), while Sánchez-Rodríguez and Spraakman (2012) classified the concept differently (i.e. physical, transactional and informational levels of ERPs). Thereby, business process can be referred to as flows through different functions in an organization (Magal & Word 2009; Child & McGrath 2001).

Meanwhile, Scapens and Jayazeri (2003) introduced ERPs from the perspective of business users, emphasizing on the criticality of integration, standardization, routinization and centralization of business process information to facilitate the role of ERPs in managing the businesses. Recently, Rahimi, Møller and Hvam (2016) stated that the rolling out of the single-instance ERPs was not only about technology standardization, but also include business process standardization and data integration. In spite of the great development of ERPs adoption, the understanding of the role of ERPs in facilitating business decision remains

unclear. Apparently, researchers (e.g. Kallunki et al. 2011;Ruivo et al. 2014) tend to examine the ERPs on a single dimension. Recognizing the limited knowledge in understanding the ERPs attributes from a business users view, this study observes the ERPs conceptualization via business process similar to Sánchez-Rodríguez and Spraakman (2012) and Scapens and Jazayeri (2003), which has not been empirically supported. Considering that, this study aims to provide an empirical justification of the notion.

FORMS OF MANAGEMENT CONTROL

MC is anticipated to motivate managers in ensuring proper manner of accomplishment of organizational objectives. This is carried out by controlling and by rewarding and promoting people according to certain criteria (Cugueró-Escofet & Rosanas 2013). There have been various definitions of the concepts in the MC literature which has largely been a first point of criticism on this literature stream (Chenhall, 2003). Chenhall (2003) indeed set forth the terms MCS, MAS, and organizational controls to be often used rather interchangeably. Obviously, the purpose of control is to guide and monitor organizational actions in order to achieve the organizational objective as well as establishing its competitive advantage. Since MC has been studied in different perspective, to date, there has not been a single universally recognized definition of MC available (Helsen, Lybaert, Steijvers, Orens & Dekker 2017). Prior studies has posited various MC typologies, ranging from mechanistic to organic control approaches, as listed in Table 1. In general the control dimension characteristically focuses on worker behavior, output and/or the minds of the employees and consists of an apparatus for specifying, monitoring and evaluating individual and collective action. There has been substantial discussion on MC under different labels where cross similarity often exits among the different MC typologies.

Alternatively, MC could be described according to its forms of control. The entire picture of management accounting is based on the principle that MC is achievable, crucial, and, indeed, essential. Regardless the wide array of MC dimension, Alvesson and Karreman (2004) argue that more appropriate to observe the MC on its forms of control or in the form of a specific mode of control dominating. Previous studies basically used same types of control with different labels in relation to forms of MC. Drawn upon Alvesson and Karreman (2004) and Cäker and Siverbo (2014), forms of MC incorporate all dimensions of control grouped into two specific labels namely technocratic and socio-ideological (refer to Table 2).

Most studies on social control of work and organization have conventionally focused on the objective of behavioral aspects of control (Alvesson & Karreman 2004). Edwards (1979) reviewed five modes of control over work namely simple, technical, bureaucratic, occupational control and worker self-control. Meanwhile, the use of personal exercise of power of the boss or owner over the worker is identified as simple control. Technical control is related to the technology of work, while bureaucratic control is carried out through polices, rules, formal incentives and other impersonal devices are defined as. Occupational control is defined as control on work behavior in terms of appropriate/no appropriate work behavior. Finally, worker self-control is when the workers have a high degree of discretion. Auzair and Langfield-Smith (2005) however classify types of MC to more bureaucratic and less bureaucratic. This includes action control, formal control, tight control and restricted control. Impersonal control has been classified as more bureaucratic. According to Merchant and Van der Stede (2007), MC is designed as results and action controls and typically reside within the domain of formal control elements (Kleine & Weißenberger 2014). In terms of technocratic controls which are directly aimed at indicating what should be done or what should be achieved, through certain measures like rules, procedures, standards, budgets, performance measures and reward systems. This is somewhat familiar or closely related to more commonly used constructs action controls and results controls (Merchant & Van der Stede, 2007).

Conversely, socio-ideological forms of control are more often labeled clan controls or informal controls (Langfield-Smith 1997). Researchers who focus on ideology usually refer to forms of controls as clans or cultures, although the 'culture' concept is frequently understood in a broader and more complex sense. Ideology can be characterised as an integrated set of values, ideals

TABLE 1. Management Control Dimensions

The MC dimensions	Sources
Action/results controls	Ouchi (1979), Merchant (1998)
Formal/informal controls	Amigoni (1978), Modell (1996), Merchant (1998), Whitley (1999)
Tight/loose controls	Amigoni (1978), Merchant (1998), Whitley (1999)
Restricted/flexible controls	Otley (1994)
Impersonal/interpersonal controls	Whitley (1999)
Action/results/ personal/ cultural controls	Merchant & Van der Stede (2007)
Planning, cybernetic control, reward and compensation, administrative and cultural controls	Malmi & Brown (2008)
Accounting and non-accounting	Abernethy & Brownell (1997).
More bureaucratic and less bureaucratic	Auzair & Langfield-Smith (2005)

TABLE 2. Forms of Management Control

Technocratic forms of control	Socio-ideological forms of control
Formal	Informal
Tight	loose controls
Action/results controls	personal/ cultural controls
Accounting	non-accounting
More bureaucratic	less bureaucratic
Restricted	flexible controls
Planning, administrative and cybernetic control	reward and compensation and cultural controls

and understandings about a specific part of social reality justifying certain commitments and actions (Beyer 1981; Geertz 1973; Weiss & Miller 1987). As regards to this, ideology is sometimes perceived as control (Czarniawska 1988). This however, encompasses a broad and general concept of possible forms of more specific types of control. Ideology is often challenged with a single traditional idea of management or control. Beckérus, Edström, Edlund, Ekvall, Forslin & Rendahl (1988) contend for a view on management based on control through ideology (ideas) instead of control through instructions. Alvesson (1987) states that socio-ideological control involves efforts to persuade people to adapt to certain values, norms and ideas about what is good, important, praiseworthy, etc in terms of work and organizational life. Ideologies justify certain principles, actions and feelings, and discourage others. Alvesson and Karreman (2004) strongly suggest that socio-ideological controls which are close to types of informal control can affect organizational behavior in a less direct way.

A hallmark study on early management accounting studies in examining the effects of integrated, enterprise wide information systems (e.g. ERP) on management accounting and management accountant's work was carried out by Granlund and Malmi (2002). It was concluded in the study that there is no apparent evidence of the critical role of ERPs and its foremost impact in management accounting. Alternatively, in management accounting and control procedures, the findings pointed to small changes relatively. In accordance with the findings, it was reported by Scapens and Jazayeri (2003) using a longitudinal case study of the implementation of ERPs in the European division of a large US multinational, management accounting change is an evolutionary process. Despite there were no fundamental changes in the nature of the management accounting information following the implementation of SAP, there were changes in the role of management accountants - particularly: (i) the elimination of routine jobs; (ii) line managers with accounting knowledge; (iii) more forward-looking information; and (iv) a wider role for the management accountants.

Subsequently, Granlund and Malmi (2002) demonstrated that ERPs lead to change in control approaches due to centralization of system coordination resulting homogenization of controls. Similarly ERPs do affect firm's budgeting practices which in turn improve firm performance (Chapman & Kihn 2009). Additionally, Kallunki et al. (2011) investigate the role of formal and informal MC as mechanisms that mediate the effect of ERPs adoption on firm performance using survey data drawn from70 Finnish business units. The study also discovered a significant path from ERPs to formal controls. Meanwhile Sánchez and Spraakman (2012) using multiple case studies also reported a significant impact of ERPs on MC which increases efficiency and effectiveness. Accordingly, the following hypotheses are posited:

H_1: ERPs are positively associated with technocratic control

H_2: ERPs are positively associated with socio ideological control

COMPETITIVE ADVANTAGE

ERPs investment comes with the expectation of achieving the goals in developing certain capabilities and assets along with enhancing managerial and technical competencies to create value and opportunities for differential long term competitive advantage (Piccoli & Ives 2005). ERPs implementation is expected to generate operational benefits through innovation stimulation and capacity building involving the technology which consequently leads to value creation and long-term benefits opportunities (Piccoli & Ives 2005; Molla & Bhalla 2006). Past studies put emphasis on the significance of creating integration which leads to improvement of firm's competitive advantage. Botta-Genoulaz, Millet and Grabot (2005) showed that ERPs integration system leads to improvement of competitive advantage which is rendered through changes in culture and behaviors. Apart from that it has also been highlighted by Lengnick-Hall, Lengnick-Hall and Abdinnour-Helm (2004) that ERPs build up intellectual value leading to competitive advantage. Most manufacturing companies opt for ERPs as an acceptable choices for achieving better business performance through close integration of all internal functions and effective linking with the external operations of channel members and suppliers (Bhatt & Grover 2005; Ellram 1991; Zhang, Tan, Stormer & Kim 2005). The relationships between ERP and competitive advantage have also been established by few studies (Chapman & Kihn 2009; Kallunki et al. 2011; Mzoughi, Bahri & Ghachem 2016). Generally these studies demonstrate the role of ERPs as a tool in establishing firm's competitive advantage and boosting company's performances derived from ERPs adoption. Thus, the following hypothesis is proposed:

H_3: ERPs are positively associated with firm's competitive advantage.

Form of control is also crucial in ensuring firm success. MC is the key tool that managers should take for planning, budgeting, analyzing, measuring and evaluating useful information for proper decision making. Creative innovation as well as balance between control and flexibility will lead to increased performance and competitive advantage achievement (Simons 1995). Additionally, the effectiveness of MC communicating strategic objectives serves as the role as a MC device leading to enhanced performance (Malina & Selto 2001). Likewise companies dedicate special attention to MC systems implementation as tools needed in contributing to successful business growth (Helsen et al. 2017). Mundy (2010) showed an elaboration of the creation of dynamic tensions through attempts by managers in balancing the controlling and the facilitating the use of MC. It has also been suggested that increased level of MC usage would result in positive influence on the level of company's performance. Positive impacts of MC on business performance have been reported by many studies (Songini & Gnan 2015; Harlez & Malagueño 2016). All the results are in line with Schulze, Lubatkin and Dino (2002) and Lubatkin, Schulze, Ling, and Dino (2005), who gave a good comparison of positive effect of the use of MC on competitive advantage. Previous studies showed differential results albeit all results point to the achievement of competitive advantage. Given that, the following hypotheses are proposed:

H_4: Technocratic control is positively associated with firm's competitive advantage.
H_5: Socio ideological control is positively associated with firm's competitive advantage.

Accordingly the proposed research framework is as follows:

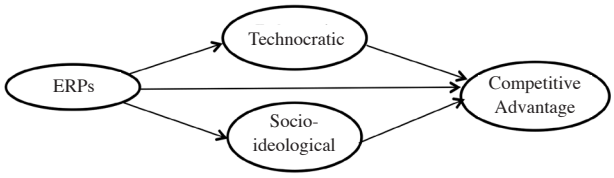

FIGURE 1. Research framework

RESEARCH METHOD

SAMPLE

The sample was selected with random sample extracted from the database of the Federation of Malaysian Manufacturers of Malaysia. A random sample featured 972 Malaysian manufacturing companies (FMM 2016). In this study, manufacturing sectors were selected due to characteristics such as the complexity and diversity in several areas, differentiating them from other sectors and their high level of industrial impact (Jusoh & Parnell. 2008; Pondeville, Swaen & De Rongé 2013) towards building up high competitive advantage that has resulted in the implementation of ERPs (Wylie 1990). The surveys were addressed to the Chief Operation Officers (COOs) of selected manufacturing firms. They were preferred because they are considered as the most likely to be able to provide accurate and useful data on ERPs practices, firm's MC and performance of the manufacturing firms. A total of 972 survey questionnaires were mailed with usable response of 114, giving a response rate of 11.2%. The response rate is relatively low, due the refusal to participate either because it was against the company policy or that they were too busy. However, it should be noted that there is a common pattern of low response rates (i.e. less than 20%) for mailed academic surveys in Malaysia (Ruzita, MAB & Ismail 2007). Detail of the respondent is presented in Table 3.

TABLE 3. Respondents' profile

	Frequency	Percent
Industries		
Electrical and electronic	10	8.93%
Textiles and apparels	6	5.36%
Food processing	18	16.07%
Life sciences	11	9.82%
Basic and metal products	8	7.14%
Wood – based	6	5.36%
Machinery and equipment	11	9.82%
Engineer supporting	14	12.50%
Transport equipment	8	7.14%
Petrochemical and polymer	6	5.36%
Rubber products	5	4.46%
Others	9	8.04%
Total	112	100.00%
Missing	2	
Total	114	
No of employees		
Less than 50	12	10.53%
51 – 150	24	21.05%
151 – 500	32	28.07%
501 - 1000	26	22.81%
1001 – 1500	14	12.28%
Above 1500	6	5.26%
Total	114	
Respondents		
Top management	40	35.40%
Middle management	67	59.29%
First level management	7	5.31%
Total	114	

MEASUREMENTS OF VARIABLES

In order to enhance the reliability of the findings, established instruments were used as much as possible. However, some of the instruments were supplemented or modified to meet

the requirements of the study. Multiple indicators were employed through multi-item constructs on seven-point Likert scales in order to measure the variables. Extensive pilot testing by a small group of academics and managers was used to improve the content validity of the measures. The questionnaire was pre-tested on a rigorous review process involving seven academic experts in management accounting and, ERPs and five business managers. The final measures were then improved and refined.

ENTERPRISE RESOURCE PLANNING SYSTEMS

The measurements of ERP system are based on combination of Magal and Word (2009), Sánchez-Rodríguez and Spaakman (2012), and Scapens and Jazayeri (2003) that consist of four business process attributes which are integration, standardization, routinization and centralization of business process. Berente, Vandenbosch and Aubert (2009) instrument was used to measure integration of business process which are timeliness, accessibility, transparency and granularity; Chenhall and Morris (1986) to measure the timeliness; Hsu and Liao (2014) for accessibility; and a modification of Wang and Strong's (1996) measurement for transparency. Respondents were asked the extent those items describing their firm ERPs ranging from not at all to a very great extent. Nine out of 37 items were dropped due to low factor loadings (refer to Appendix)

FORMS OF MANAGEMENT CONTROL

Forms of MC is assessed through two main dimensions which are technocratic and socio-ideological forms of control, each dimension including its own measurements. According to Merchant and Van der Stede (2007) technocratic control are closely related to the more commonly used construct action controls and result controls, while Cäker and Siverbo (2014) used result and action control to study technocratic control. Combining both dimensions, a-twenty-item control approaches originally developed by Jaworski and MacInnis (1989), which has been revised and modified by as well as an adapted version of this construct been used by Hutzschenreuter and Israel (2009) and Kleine and Weißenberger (2014) (refer to Appendix).

COMPETITIVE ADVANTAGE

The firm's competitive advantage was measured using an instrument originally developed by Govindarajan (1988). Based on the activities associated with differentiation and low cost strategies, six items were used to measure the extent to which the manager's position their firms relative to those of leading competitors, namely product selling price, research and development costs, marketing costs, product quality, brand image and product features. The instrument has been used extensively and validated in many accounting studies (for example, Govindarajan & Fisher 1990; Kumar & Subramaniam 1998). Chenhall and Langfield-Smith (1998) incorporated additional emphases that are production costs, product availability, customized product, rapid product changes, and accessibility of after-sales services. Extension of that, Chenhall (2005) improved the measurement by which was used in this study. The respondents were required to rate each of the eleven items ranging from "not important" to "very important", indicating the degree of importance of the strategic priorities to their firms. Next, they were asked to rate the actual performance of those eleven strategic priorities as compared to their competitors. A likert scale ranging from 1 "well below" and 7 "well above" as compared to their competitors' strategic priorities performance. Score of each dimension were calculated by multiplying the respective "importance" and "strategic priorities performance" items. A final level of competitive advantage for each firm was determined by taking the average of all items.

RESULTS

MEASUREMENT MODEL

The examination of the measurement model involves the examination of the relationship between each construct and its items. For reflective measurement model, the examination includes investigating the indicator loadings, indicator reliability, internal consistent reliability, convergent validity, and discriminant validity. With regards to indicator loading, the common rule of thumb for item loading is 0.708 or higher (Chin 2010; Fornell & Larcker 1981). However, according to Hair, Ringle and Sarstedt (2013), it is common to observe weaker item loading in social science studies and removing items with low loading have to be done with care as it may affect the content validity of the constructs. Besides, the consideration for removing items with outer loading between 0.4 and 0.7 is allowed, if removing the item may result in an increase in the value of composite reliability and the average variance extracted (AVE) (Hair et al. 2013). Summary of the factor loadings is shown in Table 4.

The result of the PLS algorithm revealed that most of the item loading exceeded 0.7 and below 0.85. According to Hair, Hult, Ringle and Sarstedt (2016) maximum acceptable of composite reliability is 0.95. The composite reliability and AVE of the construct were assessed after the removal of the items with low outer loading. The result demonstrates high convergent validity with centralization of ERP business process displaying the highest AVE, which is 0.712 and routinization of ERP business process showed the lowest AVE value, which is .533, exceeding the required AVE minimum level of 0.5 (Table 4). After an assessment of item level discriminant validity was done by checking for cross-loading, an assessment of construct discriminant validity was carried out by checking Fornell-Larcker criterion. Fornell-Larcker criterion postulates that the square root of each construct's AVE should be greater than latent variables' correlation with any other constructs in

TABLE 4. Summary of Factor Loadings

Contructs	Items	Factor Loadings	Cronbach's Alpha	Composite Reliability	AVE
Competitive Advantage (CA)	Provide high quality products.	0.759	0.942	0.950	0.659
	Low production costs.	0.882			
	Low price.	0.800			
	Make changes in design.	0.872			
	Make rapid mix changes.	0.817			
	Provide fast deliveries.	0.712			
	Make dependable delivery promises.	0.808			
	Effective after-sales service and support.	0.798			
	Products availability.	0.756			
	Customize products	0.892			
Technocratic Control (MCT)	Goals are established for employees.	0.838	0.931	0.943	0.673
	Performance goals is controlled	0.817			
	Potential deviations from performance goals	0.835			
	Variable remuneration components	0.839			
	Superiors monitoring	0.812			
	Superiors evaluating	0.843			
	Superiors defining	0.764			
	Superiors providing information regarding the achievement of goals.	0.815			
Socio-ideological Control (MCS)	Employees are carefully selected	0.803	0.933	0.943	0.623
	Establishing the best-suited recruiting process	0.789			
	Hiring the best-suited applicants	0.765			
	Training and development activities	0.756			
	Employee's skills.	0.811			
	Sharing informal codes	0.772			
	Mission statement conveys the values	0.760			
	Top manager's communication	0.817			
	Employees are aware of the company's core values.	0.785			
	Employees perceive the values codified in our mission statement.	0.829			
Enterprise Resource Planning Systems (ERPs)	*Routinization*				
	Automation within major types of work	0.652	0.854	0.889	0.533
	Automated process	0.754			
	Established procedures and practices.	0.745			
	Understandable sequence of steps.	0.767			
	Same tasks from day to day.	0.751			
	Work is routine.	0.733			
	Same job in the same way most of the time.	0.703			
	Standardization				
	Written rules and procedures	0.809	0.860	0.905	0.705
	The rules and procedures specify how major tasks are to be done.	0.864			
	Following the standard operating procedures	0.870			
	Considering the various situations	0.813			
	Centralization				
	Development of new systems.	0.850	0.932	0.945	0.712
	Assigning and dismissing of employee	0.850			
	Selection of large investments.	0.861			
	Budget allocations.	0.867			
	Assignment of personal to a project.	0.839			
	Tracking and control the ERP projects.	0.810			
	Approving requirements changes.	0.827			
	Integration				
	Information is upon request.	0.716	0.938	0.948	0.645
	Data in appropriate language	0.801			
	Data is maintained by the corporation	0.778			
	Information is given upon receipt	0.800			
	Information is reported without delay	0.804			
	Easily access the system.	0.833			
	Believed in the information provided	0.789			
	Obtain complete information	0.844			
	Confident with information	0.817			
	Easily browse the system.	0.840			

the model (Fornell & Larcher 1981). However, Hair et al. (2016) stated that, if certain construct is found higher than the square root of the AVE, the researcher can decide to eliminate this construct that its value found higher than the square root of the AVE in order to more closely meet the Fornell-Larcker criterion and to increase the reliability or discriminant validity. But, the researcher must also consider that the removal process does not affect the measurement of content validity. Table 5 illustrates that the square root of AVE for eight reflective constructs are higher than the correlation with other constructs.

STRUCTURAL MODEL

After establishing the measurement model in terms of reliability and validity, the next step is assessing and testing structural model. Assessment of structural model involves determining how well empirical data support the theory and therefore to decide if the theory or concepts are empirically verified for the predicted hypothesis.

The inspection comprised of assessing the structural model for collinearity issues, the level of R^2, the effect of sizes (f^2), path coefficient estimates, and the predictive relevance (Q^2) (Hair et al. 2013). Assessing the structural model for collinearity issues can be obtained by referring to collinearity statistics, variance inflation factor (VIF) under the PLS algorithm procedure in SmartPLS 3.0. With regards to PLS-SEM, a tolerance value of 0.20 or lower and a VIF value of 5.0 and higher correspondingly show a potential collinearity issue (Hair, Ringle & Sarstedt 2011). Table 6 demonstrates that the VIF yield for each construct was substantially less than the normal cut-off threshold of 5.0. Henceforth, collinearity among the predictor constructs was not an issue in the structural model proposed in this research.

Considering that PLS structural equation modeling is centered on prediction and its main objective is to maximize the variance of the dependent variables, the important criterion in evaluating a PLS structural equation modeling is the assessment of the coefficient of determination (R^2) of the endogenous constructs (Chin 2010).

Achieving the high R^2 is preferable as it indicates higher level of predictive accuracy. In accounting literature, R^2 values of 0.75 for latent variables is considered as substantial, 0.50 as moderate, and 0.25 as weak (Hair et al. 2013). Based on the results of R^2, the conceptual model displays large portion of the variance in the endogenous construct as shown in Table 7 because R^2 values for competitive advantage, social forms of MC (MCS) and Technocratic forms of MC (MCT) are 0.63, 0.654 and 0.602 respectively. Therefore, the explanatory power of the model proposed for this study was at satisfactory level.

Another important aspect of structural model evaluation is the predictive relevance model. For this purpose, the Stone-Geisser's Q^2 was observed with the use of blindfolding procedures. As shown in Table 7 blind procedures (with omission distance of 7), yielded positive Q^2 values for all endogenous constructs suggesting predictive relevance of the model (Chin 2010; Hair et al. 2011). The effect size f^2 is a measure used to evaluate the relevance of each predictor (exogenous) construct on an endogenous construct (Hair et al. 2013). It determines the extent of the contribution of exogenous construct to the R^2 value of a target construct in the structural model. The f^2 values of 0.02, 0.15, and 0.35 signify as having small, medium, and large degree of predictive relevance, respectively. Table 8 displays the result of the effect sizes for the structural model. The f^2 values of all significant predictors were found to have a larger effect on their endogenous variables compared to the insignificant predictors. The result revealed that the highest effect size of the model is on the effect of ERP on social forms of MC (1.914), followed by the effect of ERP on technocratic forms of MC (1.534) medium effect size of ERP on competitive advantage (0.183), and the lowest effect size is between MC

TABLE 5. Discriminant validity

	C	CA	I	MCS	MCT	R	S
C	0.844						
CA	0.667	0.812					
I	0.778	0.739	0.803				
MCS	0.773	0.707	0.712	0.789			
MCT	0.668	0.715	0.682	0.766	0.821		
R	0.545	0.526	0.491	0.548	0.576	0.730	
S	0.560	0.608	0.550	0.627	0.687	0.581	0.840

TABLE 6. VIF values among model predictors

Predictors	Dependent
	CA
ERP	3.5361
MCS	3.3619
MCT	2.9228

TABLE 7. Results of Structural Model Evaluation

	R Square	R Square Adjusted	SSO	SSE	Q^2 (=1-SSE/SSO)
CA	0.6412	0.6314	1,140.00	702.9132	0.3834
MCS	0.6569	0.6539	1,140.00	707.467	0.3794
MCT	0.6054	0.6019	912	567.1251	0.3782

TABLE 8. Results of f^2

	CA	MCS	MCT
ERPs	0.1831	1.9148	1.5341
MCS	0.0151		
MCT	0.0544		

and competitive advantage (0.015) and (0.054). The effect size for this model ranged from large to small effect size.

HYPOTHESES TESTING

The path coefficient in the structural model was inspected by running PLS Algorithm function. The path coefficient of a SmartPLS 3.0 model has the same interpretation as standardized beta weight in a regression analysis. Estimated path coefficient range from -1 to +1 with a path coefficient close to +1 indicates strong positive relationship and -1 signifies a strong negative relationship, while a path coefficient close to 0 suggests a weak relationship. Table 9 shows the significance testing result encompassing the path coefficient, the standard error, t-statistic, and the significance level of the analysis.

The path coefficients of ERPs on Technocratic control, Socio-ideological control and competitive advantage were statistically significant positive with path coefficient of equal to 0.811 (p .001), 0.778 (p .001) and 0.482 (p .001) respectively. Thus H1, H2 and H3 were supported (refer to Figure 2). The relationship between Technocratic control and competitive advantage with path coefficient of 0.239 (p 0.05) was also significant (H4 supported), but insignificant relationship between MCS and CA was reported. For that reason H5 is not support. The summary of the hypotheses testing is shown in Table 9.

Further analysis was undertaken to observe the indirect effect of ERPs and competitive advantage through forms of MC. Only Technocratic control and competitive advantage reported a significant of 0.186 (p 0.05), while Socio-ideological control has insignificant relationship with competitive advantage. Obviously, there would not be any indirect relationship between ERPs and competitive advantage through Socio-ideological form of MC. On the other hand, a complementary mediation may be present given that indirect effect and direct effect both are significant and point in the same direction (Hair et al. 2016). Thus, Technocratic control is having a mediation role for ERPs and competitive advantage as both paths, ERPs and MCT, and also MCT and CA were positive and significant

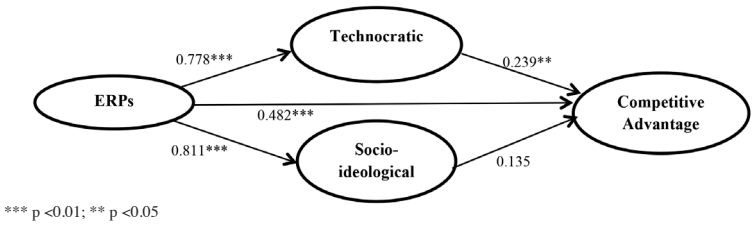

FIGURE 2. Results of the structural model

TABLE 9. PLS-SEM Path coefficients results

Hypothesis	Relationship	Coefficient	t-value	+/-	Results
H1	ERPs -> MCT	0.8105	25.7936	(+)	Supported
H2	ERPs -> MCS	0.7781	32.7391	(+)	Supported
H3	ERPs -> CA	0.4819	4.3468	(+)	Supported
H4	MCT -> CA	0.2388	2.1090	(+)	Supported
H5	MCS-> CA	0.1348	1,2262	(+)	Not supported

Discussion and Conclusion

This study has responded to the call made by several studies such as Granlund (2011) to examine the relationships amongst constructs specifically ERPs and MC to explain their relationship which claimed to be unclear. Extending the notion of ERPs is closely associated with the business process undertaken by firms, this study explores the required attributes perceived to be important to business users. Drawn upon Scapens and Jayazeri (2003), along with Sánchez-Rodríguez and Spaakman (2012) arguments, this study identified the pertinent characteristics of ERPs. A survey was conducted and supported such ERPs perspective- integration, standardization, routinization and centralization, as important attributes of an enterprise systems. Through the survey method, the findings are generalizable.

Consistently, the evidence demonstrates the significant role of ERPs towards the form of MC practice in firms. The technology does facilitate both technocratic and socio-ideological control approaches (Langfield-Smith 1997; Chenhall 2003). Hence the findings provide an additional support on resource based theory that organizational investing in resources to enable them to have the capabilities to perform better. Apparently, the study also confirms earlier results (Ruivo et al. 2014; Kallunki et al. 2011; Chapman & Kihn 2009) on the significance of ERP in building up firm's particularly manufacturer's competitive advantage. Meanwhile, the relationship between MC and competitive advantage is partly supported since an insignificant finding is reported for socio-ideological control. Kallunki et al. (2011), indeed reported a similar findings of insignificant relationships with both financial and non-financial performances. This suggests the necessity to have formal, action/result and more bureaucratic form of control. Hence, firms may need to consider having right control approach to ensure their ERP implementations do enhance their business performance.

However, there are limitations to be surrendered when drawing conclusions on the findings of this study. The relatively small sample size may require the generalization of the role of ERPs to be made with extensive caution. Despite the fact that the analyses of this study include the necessary conditions for the proof of causal relationships, a larger sample size would yield robust results. Additionally, in spite of the survey has been addressed to top executives of the firm, the actual respondents may be unfamiliar with the details of the information required when responding to some of the survey items. Nonetheless, this research does open up opportunities for future research pertaining to understanding the association between ERPs and MC. It would be interesting to know whether the findings this study can be applied in other countries as this study focused on Malaysia manufacturers. Considering the sample is strictly based on manufacturing firms, similar research could be conducted in other sectors such as services which could increase the generalizability of current study.

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