

COUNTRY OF ORIGIN EFFECT ON ORGANIZATIONAL INNOVATION IN MALAYSIA: THE MEDIATING ROLE OF STRUCTURE

¹*Azzat Mohd. Nasuridin, ¹Muhamad Jantan and ²Nur Fitriah Ahmed Fadzil*

¹School of Management, Universiti Sains Malaysia,
11800 USM, Pulau Pinang, Malaysia

²School of Management, Universiti Utara Malaysia
06010 UUM, Sintok, Kedah, Malaysia

ABSTRACT

The two main objectives of this study are: first, to determine whether the level of innovation (technological and process, product and administrative) varies by country of origin, and second, to investigate the influence of country of origin on organizational innovation (technological and process, product and administrative) via the mediating role played by organizational structure (formalization and centralization), among firms operating in Malaysia. Statistical analyses of the 80 multinational corporations and 43 locally-owned firms and joint-ventures using ANOVA revealed that significant differences do exist in terms of their innovation levels. Firms from the West (American multinationals and European multinationals) had higher levels of technological and process innovation compared to firms from the East (Eastern multinationals plus local companies and joint-ventures). Regarding product innovation, American multinationals were found to be more innovative compared to European multinationals and firms from the East (Eastern multinationals plus local firms and joint-ventures). In terms of administrative innovation, American multinationals were found to be most innovative followed by European multinationals, and lastly, firms from the East (Eastern multinationals plus local companies and joint-ventures). Additionally, country of origin had no indirect effect on the three forms of innovation via structure. Implications and suggestions for future research are discussed.

INTRODUCTION

Technological advancement has radically changed the way of doing business. As markets become more global, business environments become more challenging, and competition becomes more intense, firms can no longer rely on strategies involving cost reductions and incremental product improvements as solutions to generating greater profitability. To survive and prosper, firms need to transform themselves and search for means to enhance their competitive positions. Customers continually demand high quality products and services. Firms that fail to fulfill the needs of their customers will lose to rival companies. One alternative course of action that can be undertaken by firms as a means of

responding to customers' changeable requirements is innovation. Hence, organizations have to continuously invest in developing, generating and adopting new products, services, processes, techniques or procedures in their effort to differentiate themselves from competitors. In fact, this creation and commercialization of products and processes that will shift the technology frontier quickly is a must among firms operating in advanced nations (Porter & Stern 2001).

Although there have been several studies on the subject of organizational innovation (Bessant & Grunt 1985; Attewell 1992; Kitchell 1995; Claver & Llopis 1998), these researches were highly fragmented. Furthermore, these studies have been conducted in Western countries especially in the United States and Europe. Given the limited information regarding innovation within the Malaysian context (Mohamed 1995; Wan Jusoh 2000), the objective of the present study is two-fold. First, to understand whether the level of organizational innovation (technological and process, product and administrative) differs according to a firm's country of origin. Second, to examine whether the country of origin has an indirect effect on innovation via structure (formalization and centralization).

LITERATURE REVIEW

Country of Origin and Organizational Innovation

Country of Origin and Technological and Process Innovation

Japanese production management methods and statistical process control techniques have been fundamental to much of Japan's industrial success. For instance, the Just-in-Time (JIT) principle (Walleigh 1986), total quality control (Ishikawa, 1985), the Kanban system (Khalil 2000), and single method die exchange (SMDE) (Khalil 2000), have enhanced efficiency and productivity among Japanese manufacturing firms. According to Wong, Saunders, and Doyle (1988), the Japanese due to their risk-averse culture (Ouchi 1981) are more likely to avoid pioneering new product innovation. Instead, they are more inclined to focus on process-related technological innovation in terms of redesigning, upgrading and producing Western-invented products more cheaply and more reliably than their Western counterparts. Other Eastern-based multinationals such as those from Taiwan are said to be similar to their Japanese counterparts in terms of their emphasis on research and development (R&D), technological superiority, and production efficiency (Wong et al. 1988). According to Wong et al. (1988), in Taiwan where the Chinese way of doing business dominates, great importance is attached to trust in long-term relationships between suppliers

and buyers. Farh, Earley and Lin (1997) in their study on employees in Taiwan concluded that there is an emphasis on expressive ties regulated through personal integrity and devotion to the good of the relationship. Based on this Chinese cultural influence, it is likely that Taiwanese companies would opt for more customer focused innovation processes. Similarly, Hwang and Lee (2000) discovered that Korean firms also tend to focus on process innovation. According to Hwang and Lee (2000), Korean firms realized that to be competitive, they should change their relevant internal working methods and culture via process improvement and organizational learning. In this way, employees in Korean companies can exert their creativity and improve performance to meet the multiple goals of their employers.

Luo (1997) argued that the most striking feature of doing business in China is the importance attached to personal relationships (*guanxi*). Luo (1997) suggested that this phenomenon could be easily extended to other Chinese-culture territories such as Taiwan, Hong Kong, Singapore and Macau. In his study of foreign invested enterprises in China, Luo (1997) concluded that the ability of a firm to foster extensive *guanxi* connection constitutes a competitive advantage that lead to higher performance. The emphasis on personal relationships is also cherished in Malaysia. Apart from the fact that the Chinese community constitutes part of the Malaysian population (Abdullah 1992), the need to establish a harmonious interpersonal relationship before getting to serious business is also part of the Malay and Indian cultures (Abdullah 1996). Therefore, since Eastern societies are more process oriented, one is likely to conclude that firms from the East are bound to focus more on customer-related process innovation.

Country of Origin and Product Innovation

Historically, much of the world's invention has originated in the West, through their long tradition of R&D. Unlike companies in the East that focus more on process innovation, American firms place importance on new product development as the key to their growth and success (Barczak 1994). For instance, conducting preliminary market and technical assessments, business analysis, product development, in-house product testing, customer prototype testing, production start-up, and market launch have been found to contribute to American firms' high performance (Cooper 1986). Previous scholars (Maidique & Zirger 1984; Cooper 1986) have investigated the involvement of American firms in new product innovation. Barczak (1994) in her study of firms within the telecommunications industry of the United States discovered that high performance firms are more likely to undertake concept definition and testing activities in their new product development processes than low performance firms. Two measures of performance were utilized namely impact of new products and goal performance. Firms with high new product impact are risk-

takers and tend to aim their new products at new markets. They are likely to use R&D teams to develop new products, which have synergy with the firms' existing products. In contrast, high goal performing firms are more conservative and more market oriented than firms with high new product impact. They focus on customer needs while simultaneously striving to develop products with a significant competitive edge. All these activities are inclined to highlight the importance of product innovation among American firms. The business practices of European multinationals particularly the Swedish have been heavily influenced by the American system (Be Langer, Berggren, Bjorkman & Kohler 1999). This view is consistent with the findings made by Hayden and Edwards (2001) who noted the growing influence exerted by the British and American systems on Swedish multinational employment practices.

In comparing the quality of marketing between American and Japanese multinationals in the United Kingdom, Wong et al. (1988) discovered that Americans saw themselves as technological pioneers and exhibited greater superiority in product design. Although British companies share similar views with their American counterparts regarding short-term financial gains, the level of investment in R&D for new product innovation among British multinationals has been somewhat low compared to the Americans (Wong et al. 1988). Similarly, Denmark, Finland and Sweden have made major gains in innovative capacity since the mid-1980s by increasing their R&D workforce, raising their investment in R&D, and emphasizing policies that protect intellectual property (Porter & Stern 2001). Several Western European countries such as United Kingdom, Ireland, France and Italy have also maintained their innovative capacity (Porter & Stern 2001). Additionally, Archibugi and Coco (2001) noted that European firms are more inclined to undertake technological alliances with their American counterparts, which have been known for their emphasis on product innovation. This discussion seems to suggest that Western firms are more inclined to focus on product innovation, than their Eastern counterparts.

Country of Origin and Administrative Innovation

Following Japan's emphasis on process innovation as can be observed from its numerous production management techniques such as the JIT principle (Walleigh 1986), total quality control (Ishikawa 1985), the Kanban system (Khalil 2000), and SMDE (Khalil 2000), one can posit that the level of administrative innovation among Japanese firms would be high. Similarly, Taiwanese multinationals have been noted for their similarities to their Japanese counterparts in terms of their emphasis on production and managerial efficiency (Wong et al. 1988). Previous scholars (Wong et al. 1988; Farh et al. 1997) in their study of Taiwanese subjects discovered that interpersonal trust are deemed crucial. Thus, it would seem likely that Taiwanese companies would opt for more customer

focused administrative innovation processes. Hwang and Lee (2000) highlighted the importance of administrative innovations among Korean firms. To be competitive, the internal working methods and culture of a firm should be changed via process improvement and organizational learning so that employees can enhance their creativity and improve their firms' performance (Hwang & Lee 2000).

Luo (1997) in his study of foreign-invested enterprises in China concluded that a firm's ability to foster extensive personal linkages (guanxi) results in higher performance. Luo (1997) suggested that this emphasis on personal connections in business could be extended to other Chinese-culture territories like Taiwan, Hong Kong, Singapore and Macau. Since part of the Malaysian population is also made up of the Chinese (Abdullah 1992), personal relationships tend to be highly respected. In addition, Plakoyiannaki and Tzokas (2002) suggested that customer relationship management is basically administrative innovation. The need to deliver long-term superior products and services to customers is consistent with the Eastern tradition of maintaining good covenantal relationships. Therefore, firms in the East are likely to become more innovative in terms of administration since they are more inclined to focus on process-related issues such as fostering interpersonal relationship.

Organizational Structure and Organizational Innovation

Organizational structure has been defined in many ways. For example, structure reflects the hierarchical relations among members of an organization (March & Simon, 1958). Child (1972) defined a firm's structure in terms of the allocation of tasks and responsibilities between individual organizational members and groups to ensure effective communication and integration of effort. George and Jones (1996) viewed organizational structure as the formal system of task and reporting relationships that controls, coordinates and motivates employees so that they cooperate and work together to achieve organizational goals. In sum, structure relates to task segregation that facilitates interpersonal and intergroup communications and interactions, which in turn, helps control and coordinate a firm's activities.

In general, there are two extreme forms of structure: mechanistic versus organic. An organization with a mechanistic structure is said to consist of a hierarchy of authority whereby members operate under specific rules and regulations, functional roles are predefined, and where decentralization and complexity are relatively low (Burns & Stalker 1961). Examples of mechanistic structures include machine bureaucracies. An organic structure, on the other hand, reflects an organization in which there exist a high level of participative decision-making, a low degree of hierarchy of authority and a high degree of complexity (Burns &

Stalker 1961). Examples of organic designs include project and matrix structures. According to Burns and Stalker (1961), the two underlying major characteristics differentiating these two forms of structures relate to formalization and the locus of decision-making.

Formalization reflects the extent to which jobs within the organization are fixed to a certain standard (Robbins 1996). In other words, formalization implies the use of rules and procedures in handling job decisions and work processes (Hall, 1982). According to Robbins (1996), a highly formalized job would grant the jobholder limited discretion over what to do, how to do it and when to do his or her job. In such situation, creativity would somehow be constrained. On the other hand, in jobs where the degree of formalization is low, job behaviors are usually not programmed and employees have greater freedom and discretion to exercise in their work. Under such circumstances, new ideas are likely to be generated. Pitt and Clarke (1999) suggested that informality associated with low formalization could stimulate innovativeness.

Several studies (Hage & Aiken 1967; Papadakis & Bourantas 1998; Pitt & Clarke 1999) provided empirical evidence for the negative relationship between formalization and organizational innovation. The higher the degree of formalization, the greater the amount of explicit rules and procedures regarding how organizational members should act and behave, the lesser the ability of the firm to innovate (Papadakis & Bourantas 1998). Additionally, highly formalized structure that entails strict rules and procedures has been found to inhibit flexibility and spontaneity that a firm needs in order to internally innovate (Bidault & Cummings 1994). According to Pitt and Clarke (1999), excessive formal communication prevalent in highly formalized structures tends to inhibit the development of solutions to ambiguous problems that require collaboration across functions and organizational boundaries. In contrast, an organic structure with lower levels of formalization is said to encourage innovation (Tannenbaum & Dupuree-Bruno 1994). Low formalization encourages openness and flexibility in roles, which is a prerequisite for new idea generation (Shepard 1967). Burns and Stalker (1961) in their study discovered that firms with organic structures that entail low formalization are more inclined to innovate.

Centralization has been defined as the extent to which decision-making is concentrated at the highest level in the organization (Robbins 1996). A highly centralized organization is said to exist when only the top management makes key decisions while the lower level employees do not participate in the decision-making process. Hence, mechanistic structures characterized by high centralization will reduce employees' ownership of the decisions, thus reducing their commitment and involvement in projects and impairs communication among participants (Damanpour 1992). John (1984) suggested that centralization

tend to encourage the individual to become more opportunistic. Within such a context, members are unlikely to participate and share ideas that are essential for the success of innovation (Damanpour 1991; Moenaert, Souder, De Meyer & Deeschoolmeester 1994).

On the other hand, a decentralized structure allows lower level employees to make key decisions, which would help solve problems and lead to quicker actions (Robbins 1996). According to Hage and Aiken (1970), a decentralized structure that is participatory in nature can enhance communication channels and creates awareness of potential innovation. Decentralization fosters knowledge and expertise sharing as well as facilitates open communication, which are essential for stimulating new ideas. Previous studies (Lovelace 1986; Hurley & Hult 1998) have shown that organic, matrix and decentralized structures tend to encourage creative behaviors among individuals, which collectively would contribute to organizational innovativeness. In sum, decentralization allows for greater discretion and higher level of autonomy among employees, which in turn, encourages innovation as it engenders ownership of decision-making (Hurley & Hult 1998).

Country of Origin and Organizational Structure

Country of Origin and Centralization

A firm's country of origin may affect its structure. Of the four dimensions of national culture identified by Hofstede (1980), two dimensions may be relevant in influencing organizational structure namely collectivism and uncertainty avoidance. Collectivism relates to personal interests with the goals of the larger work groups, emphasis on sharing, cooperation and group harmony, and a concern for group welfare (Hofstede 1980). Collectivism is important to the Eastern people. For instance, collectivism is a way of life for the Japanese. The Japanese feel that their primary obligation is toward the group of which they form a part; such groups being the family, the clan, and the company (Sarath, 1985). This need to protect the welfare of others is likely to result in a structure that fosters consensus decision-making. In comparing the entry mode of American and Japanese firms, Mansumittrchai, Minor and Prasad (1999) discovered that the collectivistic nature of the Japanese affects their choice of diversification strategies. Japanese are more likely to opt for an incremental approach in terms of investments by establishing joint-ventures compared to their American counterparts. Citizens in China are also collectivistic. They focus more on the social system rather than themselves (Earley 1989). The findings made by Luo (1997) on the importance of fostering extensive personal linkages (*guanxi*) when doing business in China highlighted the collectivistic nature of the Chinese. Given the dominance of the Chinese cultural values within societies of the East

like Taiwan, Hong Kong, Macau and Singapore (Wong et al. 1988; Farh et al. 1997; Luo 1997), it can be expected that people in these countries would emphasize collectivism in their daily life. In their emphasis for relationship, participation in decision-making are highly encouraged. Thus, centralization would be lower among firms from the East.

Individualism refers to self-orientation and emphasis on self-sufficiency and control, and the pursuit of individual goals that may or may not be consistent with in-group goals (Hofstede 1980). In Western society, there is an emphasis on individualism (Triandis 1989). The individualistic orientation has led Americans to subscribe to centralization. According to Mansumittrchai et al. (1999), Americans prefer faster decision-making process. In other words, Americans are more likely to opt for centralization.

Country of Origin and Formalization

Another dimension of national culture identified by Hofstede (1980) that may have an impact on a firm's structure is uncertainty avoidance. Uncertainty avoidance refers to the degree to which people in a society feel threatened by ambiguous situations, and the extent to which they try to avoid such situations (Hofstede 1980). In high uncertainty avoidance communities, people are less secure and experience a high level of anxiety. According to scholars (Hofstede 1980; Ouchi 1981), Japanese have higher levels of uncertainty avoidance compared to their American counterparts. In comparing the entry mode of American and Japanese firms, Mansumittrchai et al. (1999) found that the risk-averse nature of the Japanese affects their choice of diversification strategies. Japanese are more likely to team up with local companies via joint-ventures. Ross (2001) in summarizing the findings by Hofstede (1993) discovered that China scored relatively high in uncertainty avoidance. In other words, it can be said that the Chinese prefer stability and predictability in their dealings. In comparing the effects of trust on performance between American and Chinese salespeople, Gima and Li (2002) found that Chinese salespersons in their bid to avoid uncertainty are likely to value supervisor's guidance and support via process control and be less concerned with the lack of autonomy and self-control.

Making connections (*guanxi*) in ensuring successful business dealings in China as discovered by Luo (1997) is basically a Confucian trait. According to Hofstede (1997), people from Hong Kong, Thailand, China, Korea and Japan scored high in Confucian dynamism values associated with persistence, hierarchical relationships, thrift and having a sense of shame. Similarly, one may be able to extend the importance of Confucian dynamism in other Eastern countries such as Taiwan, Macau and Singapore given the dominance of the Chinese cultural values at these locations. Given that exhibiting Confucian dynamism is a

reflection of one's fear for uncertainty (Robertson, 2000), it can be concluded that communities derived from nations of the East that have been known to have higher Confucian dynamism will possess higher levels of uncertainty avoidance. Abdullah (1992) also noted the historical influence of the Chinese culture on Malaysians. Given the relatively strong tendency to avoid uncertainty and lesser willingness to accept risks among people of the East like the Japanese and Chinese, one can expect that they will prefer relatively more standardized policies, rules and procedures as a basis for guiding actions. Hence, formalization would be higher among firms from the East.

Americans, on the other hand, have a much lower level of uncertainty avoidance than their Japanese counterparts (Hofstede 1980). According to Mansumittrchai et al. (1999), Americans are more inclined to take risks than the Japanese. In their study, Mansumittrchai et al. (1999) discovered that American companies prefer acquisitions as their entry strategy. If the Americans possess greater willingness to accept risks, it can be expected that they will be less likely to rely on standardized rules and procedures to guide their actions and activities. Thus, formalization would be lower among firms from the West.

Country of Origin and Innovation Via Organizational Structure

Since country of origin affects structure as reported by previous scholars (Wong et al. 1988; Luo 1997; Mansumittrchai et al. 1999), which in turn, affects firms' innovation as noted by researchers (Hage & Aiken 1967; Lovelace 1986; Bidault & Cummings 1994; Papadakis & Bourantas 1998; Hurley & Hult 1998; Pitt & Clarke 1999), it can be concluded that structure serves to mediate the relationship between country of origin and innovation.

THEORETICAL FRAMEWORK AND HYPOTHESES

Based on the discussion in the previous section, the criterion variables for this study relate to the three forms of innovation (technological and process, product, and administrative). The predictor variables will be the firm's country of origin and structure. The relationships between the study variables are depicted in Figure 1.

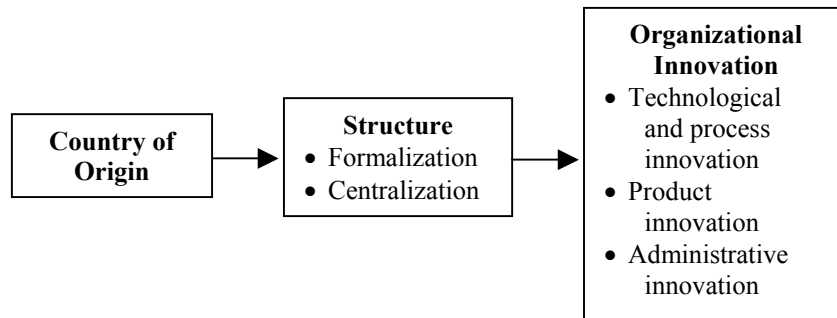


Figure 1. Theoretical framework

Eight hypotheses posited in this study are:

- H1: The level of technological and process innovation will be higher for firms from the East (Eastern multinationals and local companies and joint-ventures) than firms from the West (American multinationals and European multinationals).
- H2: The level of product innovation will be higher for firms from the West (American multinationals and European multinationals) than firms from the East (Eastern multinationals and local companies and joint-ventures).
- H3: The level of administrative innovation will be higher for firms from the East (Eastern multinationals and local companies and joint-ventures) than firms from the West (American multinationals and European multinationals).
- H4: The higher the degree of formalization, the lower will be the level of innovation (technological and process, product, and administrative).
- H5: The higher the degree of centralization, the lower will be the level of innovation (technological and process, product, and administrative).
- H6: Centralization would be lower for firms from the East (Eastern multinationals and local companies and joint-ventures) than firms from the West (American multinationals and European multinationals).
- H7: Formalization would be higher for firms from the East (Eastern multinationals and local companies and joint-ventures) than firms from the West (American multinationals and European multinationals).

H8: Country of origin has an indirect effect on innovation (technological and process, product, and administrative) via structure (formalization and centralization).

METHODOLOGY

Sample

The unit of analysis is the organization, and the participating firms were selected from both the manufacturing and service sectors in Malaysia. A manager from each targeted organization was identified as the respondent to the survey. A total of 200 questionnaires were distributed via personal contacts, mails and electronic mails. Respondents were given four weeks to answer the questionnaires. A total of 123 responses were obtained representing a response rate of about 61.5%. The sample profile is shown in Table 1.

As depicted in Table 1, a majority (65%) of the respondents were lower-level managers, followed by middle managers (32.5%), and finally top managers (2.4%). Given that this study adopted a single respondent to represent each organization, this may prove to be a limitation to the findings of the present research. However, using one-way ANOVA, it can be shown that the differences in all the major variables across respondents from different levels of management are not significant. Many of the respondents (76.4%) had bachelor degrees. This implies that respondents have the ability to understand the questions in the survey instrument and provide more accurate answers to the questions, thereby, ensuring the reliability of the questionnaires. In terms of the business category, 45.5% of the responding firms were in the electronics/electrical business, followed by 36.6% from firms in the textile business, with the remaining 17.9% from companies in the telecommunications business. Regarding industry type, 78% of the participating firms came from the manufacturing sector whilst the remaining 22% were from the services sector. In terms of ownership status, a majority (65%) of the responding firms were multinationals with the remaining being joint-ventures (6.5%) and locally-owned companies (28.5%). In terms of country of origin, 29 (23.8%) are American (including one Canadian), 25 (20.5%) are European, 25 (20.5%) are Eastern (including Singapore, Taiwan, Hong Kong, Japan and Korea), while the remainders (35.2%) are either locally owned or joint-venture companies. In terms of size, 52.9% of the responding firms had employees of 1000 or more. About 39.8% of the participating firms had annual revenues of more than USD50 million. Lastly, 57.7% of the responding firms have been operating in Malaysia for more than 10 years.

TABLE 1
CHARACTERISTICS OF THE SAMPLE

Profile	Percentage
Characteristics of Respondents	
1. Job Position	
Top level	2.4
Middle level	32.5
Lower level	65.0
2. Education	
Masters degree	12.2
Bachelors degree	76.4
Diploma	9.8
Characteristics of Organizations	
3. Business Category	
Electronics/Electrical	45.5
Textile	36.6
Telecommunications	17.9
4. Industry Type	
Manufacturing	78.0
Services	22.0
5. Ownership Status	
Multinationals	65.0
Joint venture	6.5
Locally owned	28.5
6. Country of Origin	
American MNCs	23.8
European MNCs	20.5
Eastern MNCs	20.5
Local and Joint Venture	35.2
7. Size (Number of Employees)	
Less than 500	29.3
500–999	17.9
1000–2000	23.6
More than 2000	29.3
8. Size (Total Annual Revenues)	
Less than USD5 million	22.8
USD5 million to USD50 million	37.4
More than USD50 million	39.8
9. Duration of Operations in Malaysia	
5 years or less	20.3
More than 5 years but less or equal to 10 years	22.0
More than 10 years but less or equal to 15 years	17.9
More than 15 years	39.8

Measurement and Method of Analyses

Three forms of innovation (technological and process, administrative, and product) were investigated as the criterion variables in this study. For the first two forms of innovation (technological and process, and administrative), five items were adopted from Chew (2000). A 5-point Likert-like scale ranging from (1) "Very much above industry average" to (5) "Very much below industry average" was used. To measure product innovation, three items were used of which two were adopted and modified from Chew (2000). One self-construct item was added at the suggestions of the managers during the preliminary discussion. In addition, the three forms of innovation were also measured in terms of whether it is radical or incremental and these were adopted from Cooper (1998). Thus, these two items were incorporated to measure the three forms of innovation. The first of these two items was measured using a 5-point Likert-like scale ranging from (1) "Very slow" to (5) "Very fast". The last item was measured using a 5-point response format starting from (1) "Very different" to (5) "Not different". The mean scores for each forms of innovation were computed to arrive at a summary indicator of the level of technological and process, product, and administrative innovation practised by the organization.

Apart from the country of origin, the other two predictor variables for innovation examined in this research were formalization and centralization. In terms of formalization, the 4-item scale used was adopted from Hage and Aiken (1967). A 5-point Likert-like scale ranging from (1) "Not true at all" to (5) "Very true" was used. Similarly, centralization was measured using 4-items based on a revised version of Miller and Friesen's (1982) instrument as cited in Matherly (1985). These items were measured using a 5-point response format ranging from (1) "Top executive" to (5) "Middle-level managers". The mean scores for each structural dimension will be indicative of the level of formalization and centralization existing in the organization. ANOVA was used to test hypotheses 1, 2, 3, 6 and 7 of the study. Regression was used to test hypotheses 4 and 5. To test mediation effects as conjectured in the final hypothesis, the regression procedure employed by Baron and Kenny (1986) was undertaken.

RESULTS

Table 2 presents the means, standard deviations, inter-correlations and reliability coefficients of the study variables.

TABLE 2
MEANS, STANDARD DEVIATIONS, CORRELATIONS AND
RELIABILITIES OF VARIABLES

Variabes	Mean	Std. Dev.	1	2	3	4	5
1. Formalization	2.802	0.883	(0.726)				
2. Centralization	2.116	0.933	0.197*	(0.844)			
3. Technological and process innovation	2.674	0.682	-0.090	0.033	(0.884)		
4. Administrative innovation	2.774	0.636	-0.242**	-0.268**	0.640**	(0.811)	
5. Product innovation	2.784	0.728	-0.159	-0.163	0.664**	0.650**	(0.813)

Note: ** $p < 0.01$; * $p < 0.05$: Cronbach alphas for the scales are shown diagonally in parentheses.

In brief, the mean value for formalization was found to be 2.802 with a standard deviation of 0.883. Centralization, on the other hand, had a lower mean score of 2.116 with a standard deviation of 0.933. This implies that the level of formalization and centralization existing in the firms were perceived to be moderate. With regards to the three forms of innovation, given that lower end scale for each of the innovation dimensions represents higher level of innovation, it can be concluded that the most prominent form of innovation is technological and process innovation (2.674), followed by administrative innovation (2.774), and finally, product innovation (2.784). On the average, the level of technological and process innovation, administrative innovation, and product innovation existing in the sampled firms were perceived to be moderate. Finally, as depicted in Table 2, the reliability coefficients for each of the study variables were relatively high which exceeded Nunnally's (1978) minimum requirement of 0.70. To test hypotheses 1, 2, 3, 6 and 7, ANOVA was undertaken. Of the 123 responding firms, 80 were multinational corporations with the remaining 43 being local companies and joint-ventures. Specifically, of the 80 multinational firms that responded to the survey, 28 were categorized as Eastern multinationals (comprising of companies originating from Japan, Taiwan and Singapore), 27 were categorized as American multinationals (comprising of companies originating from North America and Canada) and 25 were categorized as European multinationals (comprising of companies originating from the European Union). Table 3 indicates the ANOVA results for the structural components and the three forms of innovation according to a firm's country of origin.

As shown in Table 3, the F-statistic for technological and process innovation is significant ($\alpha = 0.01$). On closer inspection, the results of the post-hoc analysis using Duncan multiple range test indicate that the mean values for American multinationals and European multinationals were much lower than that of Eastern multinationals and locally-owned firms and joint-ventures, indicating that multinationals from the West are more innovative. This finding did not provide

support for hypothesis 1 of the study. Similarly, the F-statistic obtained for product innovation is also significant ($\alpha = 0.01$). The results of the post-hoc analysis using Duncan multiple range test indicate that the mean value for American multinationals were lower than that of European multinationals, Eastern multinationals, as well as local companies and joint-ventures. This finding did provide evidence to support hypothesis 2 of the research. From Table 3, the F-statistic for administrative innovation is again significant ($\alpha = 0.01$), with Duncan multiple range test indicating that the mean values for American multinationals, European multinationals, Eastern multinationals plus local firms and joint-ventures were significantly different. The mean value for American multinationals was the lowest suggesting that their level of administrative innovation was highest. This finding did not provide support for hypothesis 3. In terms of the two structural components, it can be observed that the F-statistics obtained were not significant. These results suggest that the level of centralization and formalization did not vary according to the country of origin. These findings did not provide support for hypotheses 6 and 7 of the current investigation.

TABLE 3
ANOVA RESULTS FOR TECHNOLOGICAL AND PROCESS, PRODUCT AND ADMINISTRATIVE INNOVATION BY COUNTRY OF ORIGIN

Variable	F-statistics	Sig. F	Post- hoc results (subsets)		
			1	2	3
Structure variables					
Centralization	1.423	0.239	–	–	–
Formalization	1.080	0.360	–	–	–
Innovation					
Technological and process	8.124	0.000	A (2.173) ER (2.480)	E (3.008) L (3.250)	
Product	10.740	0.000	A (2.089)	ER (2.584) E (2.914) L (2.851)	
Administrative	14.542	0.000	A (2.141)	ER (2.520)	E (3.642) L (3.079)

Note: Duncan's Post-Hoc Test: A = American MNCs; ER = European MNCs; E = Eastern MNCs; L = Local and Joint Venture Firms; Number in parentheses represents the mean value.

Table 4 summarizes the results of the regression analyses that examine the influence of the predictor variables on innovation.

TABLE 4
REGRESSION RESULTS: STANDARDIZED BETA
COEFFICIENTS, R² AND F VALUES

Independent variables	Dependent variables		
	Technological and process innovation	Product innovation	Administrative innovation
Formalization	-0.141	-0.072	-0.283**
Centralization	0.139	-0.151	-0.179*
R-square	0.031	0.032	0.136
F-value	1.869	2.002	9.266**

Note: **significance at $\alpha = 0.01$; *significance at $\alpha = 0.05$
Lower values of the innovation dimensions represent higher level of innovation

Overall, the explanatory power of the independent variable, structure, is low, with R² values ranging from approximately 3.1% to 13.6%, with the least being for technological and process innovation. From Table 4, it can be seen that the two predictor variables were able to explain only 3.1% of the variance in technological and process innovation, and both centralization and formalization had no significant effects on technological and process innovation. As for administrative innovation, the predictor variables were able to explain 13.6% of its variance, with both formalization and centralization having significant and positive effects, in the order of magnitude. In other words, the more formalized the structure is, the greater will be the degree of administrative innovativeness. Similarly, the more centralized the decision-making process is, the greater will be the degree of administrative innovativeness. In terms of product innovation, both the predictor variables were not able to significantly explain the variations. As shown from Table 4, the predictor variables were able to explain only 3.2% of the variance in product innovation. Both centralization and formalization had no significant effects on product innovation. In sum, these results provided partial support for hypotheses 4 and 5 conjectured in this research.

Given that there are no significant differences in formalization and centralization with respect to country of origin (as shown in Table 3), it can be concluded that the structural dimensions did not mediate the effect of country of origin on innovation. Therefore, hypothesis 8 is not supported.

CONCLUSION, IMPLICATIONS AND LIMITATIONS

The results obtained from this study indicated that organizational structure has an impact on organizational innovation. Specifically, both dimensions of structure (formalization and centralization) were found to have positive effects on administrative innovation alone. The finding relating to the positive impact of

formalization and centralization on administrative innovation may be due to the fact that the greater the usage of rules and procedures and the more centralized the decisions, the faster would be the changes made to the internal work systems of the firm. When employees are being guided by rules and procedures, their actions tend to become more standardized and uniformed, thereby leading to greater efficiency. Therefore, changes for new and speedier operational systems are likely to occur. Similarly, when top-level individuals make key decisions, they are likely to need information that can be retrieved immediately. This, in turn, is likely to result in the need for greater changes and improvements in the various internal systems of the organization.

The findings from this research demonstrated that formalization and centralization did not have any impact on technological and process, as well as product innovation. This may be due to the sample itself where there were more lower-level managers than middle and top-level managers. As such, it is possible that these managers may have perceived structure as being determined by their superiors and thus, structural changes are deemed as beyond their control. Furthermore, the sample was derived from a combination of firms within the manufacturing and service industries. It is plausible that the type of industry has an important bearing on the level of organizational innovation. For instance, manufacturing firms are more likely to be higher in terms of technological and product innovation compared to service-oriented firms. Additionally, the level of innovation may be dependent upon the type of products generated. For example, firms involved in the manufacturing of electronics products may tend to be associated with a higher level of technological and product innovation as opposed to textile-producing firms. Within such a context, structure may not be able to influence innovation particularly technological and process, and product innovation.

Both the levels of technological and process innovations, as well as administrative innovation were discovered to be high amongst American multinationals. This finding is contrary to that hypothesized. One plausible explanation may relate to the substantial investments made by American firms in upgrading their innovative capacities particularly in information and communication technologies (Archibugi & Coco 2001) and providing an attractive environment for innovation (Porter & Stern 2001). This is consistent with Khalil's (2000) explanation that the United States still has the greatest technological edge in the world.

From a practical viewpoint, the findings from this research suggest that in order to foster administrative innovation within the firm, work processes should be more formalized and decision-making should be geared towards centralization. When work is implemented according to some formal guidelines and procedures,

standardization is likely to prevail, thereby, ensuring the smooth running of the firm's administrative processes. Additionally, decision-making made by top-level managers requires quick retrieval of information, which in turn, is likely to result in faster internal work systems.

The study has three major limitations. First, it utilizes a single respondent to capture organizational level data. It would have been better had this study captured the organizational level data using summary measures from multiple respondents per organization. Second, this investigation makes use of the survey method. In order to enhance the quality of findings, it is recommended that future researchers conduct personal interviews with the respondents in order to enhance their understanding of innovation. This is because the innovation construct is a relatively complex phenomenon. Third, this study is limited in scope in terms of the number of variables explored. Thus, future studies may need to incorporate other organizational variables besides structure, for example, organizational culture, which may be a better mediator of a firm's level of innovation.

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