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Effect of Business Characteristics and ERP Implementation Strategies on ERP Outcomes: An Exploratory Study

Pairin Katerattanakul
Western Michigan University, pairin@wmich.edu

James J. Lee
Seattle University, jinyoul.lee@gmail.com

Soongoo Hong
Dong-A University, shong@dau.ac.kr

Hwee-Joo Kam
North Central Michigan College, hkam@ncmich.edu

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ABSTRACT

Although much academic research has been done on various ERP-related issues, little research has focused on the effects of business characteristics and ERP implementation strategies on the outcomes resulted from implementing ERP. Thus, the focus of this study is to explore the effects of business characteristics and ERP implementation approaches on ERP outcomes. To this end, data collected from 256 Korean manufacturing firms were analyzed by Cluster Analysis to identify groups of companies having similar business characteristics and adopting similar ERP implementation approaches. Then, the differences in ERP outcomes among these groups of companies were examined. Results showed that large manufacturing firms with make-to-order production approach had significantly higher perceived benefits in external coordination than other firms.

Keywords

Business Characteristics, ERP Implementation Approaches, ERP Outcomes, SMEs, Cluster Analysis

INTRODUCTION

Enterprise resource planning (ERP) systems have been touted to streamline organizational functions and processes by integrating enterprise-wide data and business processes. However, ERP implementation is risky and requires a substantial amount of resources (Cliffe, 1999). Thus, ERP implementation has received strong attention from practitioners and academia. Much academic research has been done on issues related to ERP implementation and ERP outcomes (e.g., Aladwani, 2001; Beard and Sumner, 2004; Gattiker and Goodhue, 2002; Lengnick-Hall, Lengnick-Hall and Abdinnour-Helm, 2004; Markus, Axline, Petrie and Tanis, 2000; Parr and Shanks, 2000; Sumner 2000).

Although much academic research has been done on various ERP-related issues, none of the previous studies has focused on the effects of business characteristics and ERP implementation approaches on the outcomes resulted from implementing ERP systems. Thus, the objective of this study is to explore the effects of the combination of business characteristics and ERP implementation approaches on ERP outcomes. To do this, we employed Cluster Analysis to identify groups of manufacturing firms having similar business characteristics and adopting similar ERP implementation approaches, and then we examined the differences in ERP outcomes among these different groups of manufacturing firms. This current study contributes to literature in two ways. First, this research identifies, for manufacturing firms, the relationship between ERP implementation approaches and business characteristics. This relationship could, in turn, affect the outcomes resulted from implementing ERP systems. Second, this study empirically tests the role of the combination of business characteristics and ERP implementation approaches in explaining ERP outcomes. Thus, this study should shed some light on the factors that affect ERP outcomes.

ERP IMPLEMENTATION APPROACHES

When implementing ERP systems, companies may either reengineer their existing business processes and/or customize the software packages (Amrani, Rowe and Geffroy-Maronnat, 2006). In this study, we use two terms to conceptualize these choices: process re-configuration and software customization. Process re-configuration is defined as the adoption of the best practice business processes embedded in an ERP system without modifying the ERP software. This adoption leads to process re-configuration or reengineering for the adopting company. Software customization occurs when the adopting company will not or can't change its existing business processes, and instead modifies ERP software to meet its business requirements.

Additionally, recent research suggests several ERP rollout approaches (Parr and Shanks, 2000), including:

- The "big bang" approach that has a single go-live date for all selected ERP modules. It refers to a total effort to implement all selected ERP modules together at once.
- The "mini big bang" approach that has several go-live dates for different subsets of ERP modules.
- The "phase implementation" approach that involves incrementally implementing the ERP either module-by-module or site-by-site in a phased manner.

Finally, when implementing ERP systems, companies could employ different ERP selection approaches (Katerattanakul, Hong and Lee, 2006; Mabert, Soni and Venkataramanan, 2000; Olhager and Selldin, 2003). That is, companies may pursue a single packaged ERP, select best-of-breed from several ERP packages, develop their ERP in-house, or pursue a hybrid approach.

BUSINESS CHARACTERISTICS

For manufacturing companies, business requirements such as product customization, volume flexibilities, production volume, set-up and production schedules, number of suppliers, and labor skills may determine their production approaches (Yen and Sheu, 2004). Typically, the production approach is categorized into two continuums: make-to-order (MTO) and make-to-stock (MTS) (Gupta and Benjaafar, 2004). Under the MTO approach, a production order is released to the manufacturing facility only after a firm demand has been received, while under the MTS approach, products are manufactured in anticipation of future orders and stored in the finished goods inventory (Youssef, van Delft and Dallery, 2004).

A significant increase in production variety normally goes hand-in-hand with a shift from the MTS approach to the MTO approach (Gupta and Benjaafar, 2004). The MTO approach is good for customization and volume flexibilities (Yen and Sheu, 2004); that is, when products are low in volume, but high in variety. The MTO approach requires managers to account for the added complexity emanating from the increased product range, more detailed specifications on batch sizes, and due dates which must be adhered to (Prasad, Tata and Madan, 2005). While the MTO approach eliminates finished goods inventory and reduces a firm's exposure to financial risk, it usually spells long customer lead times and large order backlogs (Gupta and Benjaafar, 2004).

When there are requests for high production volume, long set-up times, stable production schedules, a relatively small number of suppliers, and lower labor skills, it is better for manufacturing firms to implement the MTS approach to obtain immediate reactivity to external demands at the cost of inventory holding expenses (Yen and Sheu, 2004; Youssef, van Delft and Dallery, 2004).

RESEARCH FRAMEWORK AND HYPOTHESIS

In manufacturing firms, different production approaches lead to different resource allocation systems and distinctive communication systems to align the downstream, midstream, and upstream processes (Prasad et al., 2005). It has been suggested that production planning and control often have implications for implementing technology (Li, Markowski, Markowski and Xu, 2008). In ERP implementation, manufacturing infrastructure (e.g., resource allocation systems, communication systems) was found to have significant positive effects on customer-focused performance (Li et al., 2008). Without the proper manufacturing infrastructure, a firm may not be able to achieve the full competitive advantage that ERP can provide (Hayes, Pisano, Upton and Wheelwright, 2005).

These suggest that there exists a relationship among business characteristics (e.g., production approach), ERP implementation approaches, and ERP outcomes. Additionally, the relationship between business characteristics and ERP implementation approaches can be understood in terms of organizational configuration referring to "commonly occurring clusters of attributes of organizational strategies, structures, and processes" (Ketchen, Thomas and Snow 1993, p. 1278). The basic premise of this organizational configuration theory is that identifying groups different from others but similar within the group allows the better understanding of the relationship between organizational characteristics and performance (Ketchen et al., 1993).

In this study, we defined the clusters of manufacturing companies based on two main attributes: business characteristics (i.e., production approach, company size) and ERP implementation approaches (i.e., process re-configuration vs. software customization, ERP rollout approaches, ERP selection approaches). Then, we investigated whether making clusters of manufacturing companies that have similar business characteristics and pursue similar ERP implementation approaches is a better way of understanding the differential ERP outcomes. Figure 1 shows the research framework of this study.

Hypothesis 1: The outcomes resulted from implementing ERP in manufacturing companies pursuing different combination of business characteristics and ERP implementation approaches are significantly different from that of others.

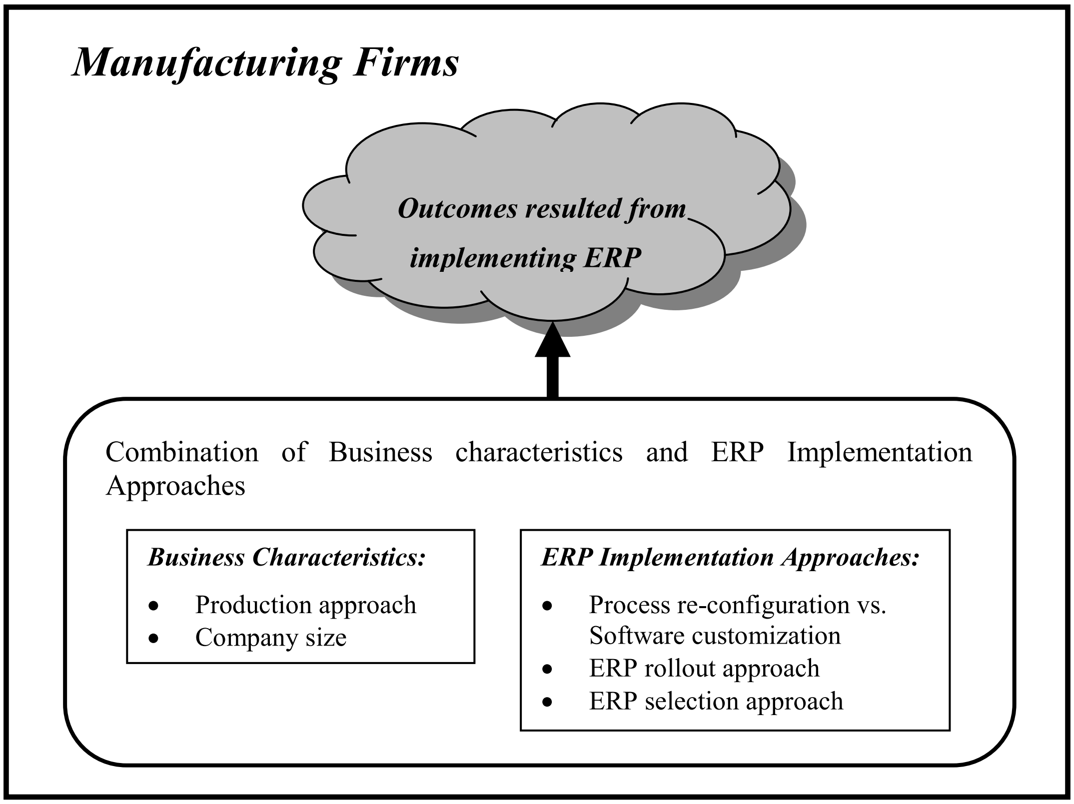

Figure 1. Research Framework

RESEARCH METHODOLOGY

Data collection

Data used in this study were collected in a survey conducted by the Pollever Research Center, a market research company in Korea (www.pollever.com). The questionnaire used was adapted from the instruments used in similar survey studies (Mabert et al., 2000; Olhager and Selldin, 2003). A total of 366 responses were collected. However, 110 of those responses included incomplete data; thus, 256 responses were used in the analysis.

Business Characteristics and ERP Implementation Approaches

Among the 256 responding firms, majority of them (71.88%) have less than 500 employees (see Table 1). Thus, these firms are small-to-medium enterprises (SMEs). In addition to company size, production approach is another business characteristic investigated in this study. Majority of the responding firms (69.92%) are dominated by MTO (65% or more MTO); whereas only 10.16% of them are dominated by MTS (65% or more MTS). The remaining 19.92% of the responding firms have a more or less equal split between MTS and MTO.

Almost half of the responding firms (43.75%) pursued a single packaged ERP. Approximately 27.73% of them pursued a more multifaceted approach by selecting best-of-breed from several ERP packages. Interestingly, 28.52% of the responding firms indicated that all or parts of their ERP were developed in-house.

When implementing their ERP systems, most of the responding firms (75.0%) followed either the "Big bang" or the "Mini big bang" implementation approaches. Only 25.0% of the responding firms reported using the "Phase Implementation" approach (either "Phase-in by module" or the "Phase-in by site").

Finally, three ERP modules – Distribution / Logistics (DLModule), Material Management (MMModule), and Production Planning (PPModule), are directly related to manufacturing process and widely implemented in Korean manufacturing firms. Thus, these three ERP modules were investigated in this current study. The result suggests that, when implementing these three ERP modules, the responding firms tended to conduct software customization, rather than process re-configuration (see Table 1). On average across all implementations of these three ERP modules in the responding firms, 47.27% of the implementations involved some ERP software customization; whereas only 28.51% of the implementations involved some re-configuration of the existing business processes. Approximately 24.22% of the implementations of the three ERP modules in the responding firms did not need to conduct either ERP software customization or process re-configuration as the ERP modules and the existing business processes were fit to each other.

Number of employees (SIZE):	*%*
1. ≤ 500	71.88
2. > 500	28.13
Production Approach (MTSMTO)	*%*
1. Portions of items produced by MTO are ≥ 65%	69.92
2. Portions of items produced by MTO and by MTS are approximately equal	19.92
3. Portions of items produced by MTS are ≥ 65%	10.16
ERP selection approach (SELECT):	*%*
1. A single ERP package	43.75
2. Best-of-breed from several ERP packages	27.73
3. In-house development for all or parts of ERP system	28.52
ERP rollout approach (ROLLOUT):	*%*
1. "Big bang": a single go-live date for all ERP modules	47.66
2. "Mini big bang": several go-live dates for different subsets of ERP modules	27.34
3. "Phased-in by module or by site": incrementally implement the ERP system	25.00

Process re-configuration vs. Software customization (MODIFY)	*DLMODULE*	*MMMODULE*	*PPMODULE*
1. Significant numbers of changes are made to the ERP module to fit the existing processes	15.63%	12.50%	12.89%
2. Some changes are made to the ERP module to fit the existing processes	32.81%	33.59%	34.38%
3. The ERP module and the existing processes are fit to each other without any change	25.39%	24.61%	22.66%
4. Some changes are made to the existing processes to fit the ERP module	20.31%	23.83%	20.70%
5. Significant numbers of changes are made to the existing processes to fit the ERP module	5.86%	5.47%	9.38%

Table 1. Business Characteristics and ERP Implementation Approaches

ERP Outcomes

The six ERP outcomes were administered by using the 5-point Likert scale ranging from "a great amount of benefit" to "not at all". The responses indicate that majority of the responding firms perceived at least some benefit from implementing ERP systems (see Table 2). The responding firms experienced improved performance in terms of quality and availability of information, coordination with both suppliers and customers, and competitive impact (i.e., linking to global activities and gaining strategic advantage). These results are similar to those found in the previous studies on U.S. and Swedish manufacturing firms (Mabert et al., 2000; Olhager and Selldin, 2003).

Area benefiting from implementing ERPsystem	*A great amount of benefit*	*Significant amount of benefit*	*Some benefit*	*Only a little benefit*	*Not at all*
Improved coordination with customers (CUST)	8.2	46.48	32.42	8.98	3.91
Improved coordination with suppliers (SUPPLY)	5.47	46.48	37.50	8.98	1.56
Link to global activities (GLOBAL)	6.64	31.64	42.19	13.67	5.86
Gain strategic advantage (STRADV)	4.69	31.25	49.22	9.77	5.08
Quality of information (QUAINFO)	14.06	38.67	32.03	12.50	2.73
Availability of information (AVAINFO)	15.23	47.27	30.08	6.25	1.17

Table 2. ERP Outcomes (in percentage)

Procedure

Cluster Analysis and Analysis of Variance (ANOVA) were employed to examine the hypothesis (Bergeron, Raymond and Rivard, 2004; Pollalis, 2003). We used the two-step clustering method in SPSS 16.0 for our analysis. Before performing cluster analysis, we conducted construct reliability and validity tests.

Construct Reliability

The level of process re-configuration vs. software customization was measured across three ERP modules – DLModule, MMModule, and PPModule. Thus, we needed to assess the reliability of this construct. Additionally, among the six ERP outcomes, we explored whether similar outcomes could be grouped to form some constructs. First, we conducted an Exploratory Factor Analysis (EFA) on these nine measuring items. The factor loadings shown in Table 3 suggest four constructs: process re-configuration vs. software customization (MODIFY), informational impact (INFO), external coordination (EXTCO), and competitive impact (COMP). All of these four constructs have their Cronbach's Alpha (α) values (reported on the diagonal of Table 4) either above or very close to the cutoff point of 0.70 (Nunnally 1978).

Then, based on the EFA result which suggested a measurement model with four constructs, we estimated this measurement model by conducting a Confirmatory Factor Analysis (CFA). The CFA results are presented in Appendix A. Additionally, the ratio between Chi-square (χ^2) and degrees of freedom (d.f.), the root mean square error of approximation (RMSEA), the goodness-of-fit index (GFI), the comparative fit index (CFI), and the normed fit index (NFI) of this measurement model suggest that the measurement model with four constructs fits the sample data fairly well. We also computed the Composite Reliability (CR) and the Average Variance Extracted (AVE) values of the four constructs (see Table 4). All CR values, except that of the COMP construct (i.e., 0.676), are above the recommended threshold of 0.70 (Fornell and Larcker, 1981; Hair, Tatham, Anderson and Black, 1998; Segars, 1997). Similarly, all AVE values are above the suggested threshold of 0.50 (Hair et al., 1998; Segars, 1997), indicating that the four constructs have captured a relatively high level of variance. All the results of these reliability tests indicate a reasonably high level of instrument reliability.

Convergent and Discriminant Validity

All loadings from the CFA results (see Appendix A) are high and the t-values (ranging from 4 to 14) for all loadings are above the 2.54 threshold supporting the statistical significance of the loadings ($p < 0.01$). Additionally, all Squared Multiple Correlations (R^2) values are high. These results are the indicators supporting the assertion that the measuring items in this study are "good" measures of the constructs (Gefen, Straub and Boudreau, 2000).

Based on the factor loadings of the EFA results reported in Table 3, there is no cross loading above 0.40. This suggests the discriminant validity of the four constructs (McKnight, Choudhury and Kacmar, 2002). Additionally, as shown in Table 4, the square root of the AVE of each construct is greater than any of the construct's correlations with other constructs, which provides evidence for the discriminant validity of the constructs in the model (Fornell and Larcker, 1981; Segars, 1997).

We also compared the discriminant validity in the original measurement model with four constructs against other measurement models with only three constructs, which included every possible combination of collapsing two constructs into one (Gefen et al., 2000). The Chi-square value in the original measurement model was significantly better than the Chi-square value of every reduced measurement model.

	Factors			
	EXTCO	MODIFY	INFO	COMP
CUST	.929			
SUPPLY	.927			
MMMODULE		-.929		
PPMODULE		-.884		
DLMODULE		-.863		
QUAINFO			.890	
AVAINFO			.860	
GLOBAL				.844
STRADV				.886

Table 3. Exploratory Factor Analysis

	CR	AVE	1	2	3	4
1. EXTCO	0.843	0.729	(.838)			
2. MODIFY	0.875	0.701	.312	(.872)		
3. INFO	0.701	0.540	.375	.149	(.693)	
4. COMP	0.676	0.512	.504	.128	.402	(.673)

Table 4. Construct Correlation and Reliability

Cluster Analysis

A three-cluster solution was found to be the most parsimonious grouping of the responding firms and also the solution that best reflected the meaningful patterns of the relationships between business characteristics and ERP implementation approaches in our research framework. Table 5 shows the mean and standard deviation of the five cluster variables for each of the three clusters. Figure 2 illustrates these mean scores (or cluster centers) with a snake diagram.

The ANOVA results indicate that the three clusters are significantly different in terms of three cluster variables – SIZE, MTSMTO, and SELECT (see Table 6a). The responding firms in Cluster 1 were small firms focusing more on MTS and more likely to select a single ERP package – 'small firms with MTS-oriented'. In contrast, the responding firms in Cluster 2 were large companies focusing more on MTO and more likely to select best-of-breed from several ERP packages together with some in-house development – 'large firm with MTO-oriented'. Finally, the responding firms in Cluster 3 were small firms focusing only on MTO and more likely to select a single ERP package – 'small firms with MTO-oriented'.

The post hoc test results show that all three clusters are significantly different from each other in only two cluster variables – SIZE and MTSMTO (see Table 6b). This result may be understood based on the relationship between the number of product offerings and the production approach. The increase in number of product offerings goes hand-in-hand with a shift from MTS approach to MTO approach (Gupta and Benjaafar, 2004) and normally large firms offer a larger product variety than small firms do.

Result and Discussion

To test the hypothesis, we used ANOVA to check the differences in ERP outcomes across companies in the three clusters. Table 7 shows the mean and standard deviation of the three ERP outcomes for each of the three clusters. Based on the mean scores of ERP outcomes across the three clusters, companies in all three clusters reported that they experienced at least some benefit in all three ERP outcomes: external coordination (EXTCO), informational impact (INFO), and competitive impact (COMP). However, the ANOVA results (see Table 8a) suggest that companies in different clusters experienced significant differences in their ERP outcome regarding the coordination with their suppliers and customers (i.e., EXTCO). Furthermore, results of the post hoc test (see Table 8b) show that companies in Cluster 2 (large firms with MTO-oriented) reported significantly higher benefit from their ERP implementations regarding the coordination with their suppliers and customers than the companies in Cluster 1 (small firms with MTS-oriented) and the companies in Cluster 3 (small firms with MTO-oriented) did.

Variables	Cluster 1 small firms MTS-oriented	Cluster 2 large firms MTO-oriented	Cluster 3 small firms MTO-oriented	Total
SIZE	1.1552 (0.365)	2.0000 (0.000)	1.0000 (0.000)	1.2813 (0.450)
MTSMTO	2.4483 (0.502)	1.3016 (0.463)	1.0000 (0.000)	1.4023 (0.667)
SELECT	1.7931 (0.874)	2.0952 (0.756)	1.7556 (0.842)	1.8477 (0.838)
ROLLOUT	1.9655 (0.837)	1.7302 (0.787)	1.7111 (0.827)	1.7734 (0.823)
MODIFY	2.7568 (0.991)	2.9312 (1.120)	2.6519 (0.982)	2.7448 (1.022)
cases	58	63	135	256

Table 5. Mean and Standard Deviation (reported in parenthesis) of Cluster Variables for Each Cluster

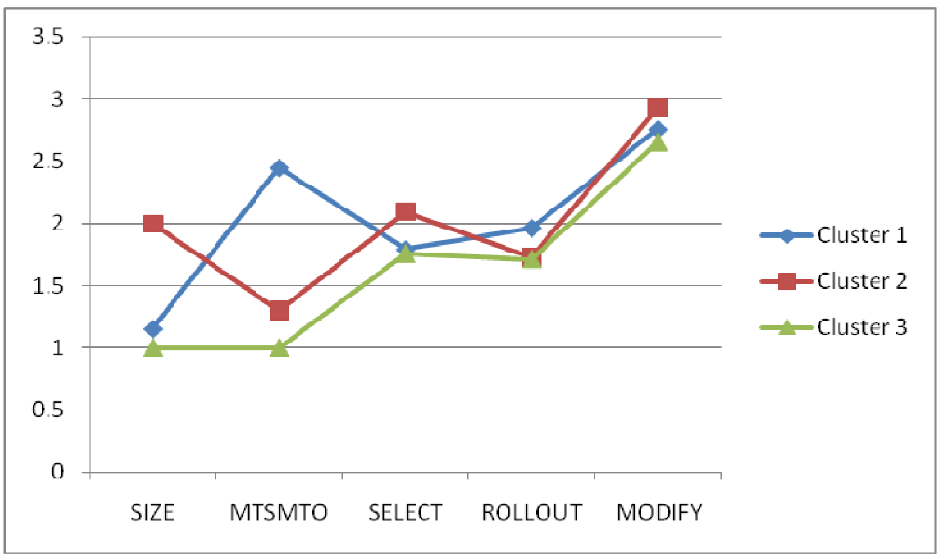

Figure 2. Snake Diagram of the Cluster Centers

Both large and small firms know that it is important to coordinate with their business partners and adapt to the demand of logistics chain integration. Unfortunately, small firms are subject to contradictory pressures forcing them to provide better logistics contributions and to develop and maintain closer relationships with their trading partners despite their limited resources (Bagchi and Virum, 1998).

For small firms, logistics chain integration is often triggered by pressure from large customers. Large manufacturing enterprises usually find themselves at the top of large networks of suppliers which are mostly small manufacturing firms. Some large manufacturing enterprises place strong pressure on the small manufacturing enterprises (i.e., the suppliers) to adopt their logistics chain integration (De Toni, Nassimbeni and Tonchia, 1995). However, the logistics chain integration that suits large manufacturing enterprises is not always compatible with the features and the intrinsic characteristics of small manufacturing enterprises. As a result, small manufacturing enterprises find themselves subordinated to the interests of large manufacturing enterprises and their supply chains (Gelinas and Bigras, 2004).

In sum, despite their limited resources, small manufacturing enterprises are often forced to adopt the logistics practices that may be more suitable for large manufacturing enterprises. This unilateral relationship leads to several disadvantages, including limiting the small manufacturing enterprises' relationships with other customer. Thus, when compared to large manufacturing enterprises, small manufacturing enterprises may perceive that they gain limited benefits from implementing information technologies such as ERP systems to participate in logistics chain activities and coordinate with their suppliers and customers.

Variables		Sum of Squares	df	Mean Square	F	Sig.
SIZE	Between Groups	44.147	2	22.073	734.474	< .001
	Within Groups	7.603	253	.030		
	Total	51.750	255			
MTSMTO	Between Groups	85.944	2	42.972	393.700	< .001
	Within Groups	27.615	253	.109		
	Total	113.559	255			
SELECT	Between Groups	5.179	2	2.590	3.768	.024
	Within Groups	173.879	253	.687		
	Total	179.059	255			
ROLLOUT	Between Groups	2.782	2	1.391	2.069	.128
	Within Groups	170.077	253	.672		
	Total	172.859	255			
MODIFY	Between Groups	3.367	2	1.683	1.619	.200
	Within Groups	263.071	253	1.040		
	Total	266.438	255			

Table 6a. ANOVA testing Equality of Cluster Variables

	I J	Mean Difference (I – J)	Std. Error	Sig.
SIZE	Cluster 1 vs. Cluster 2	-.8448	.0316	<.001
	Cluster 1 vs. Cluster 3	.1552	.0272	<.001
	Cluster 2 vs. Cluster 3	1.0000	.0265	<.001
MTSMTO	Cluster 1 vs. Cluster 2	1.1467	.0601	<.001
	Cluster 1 vs. Cluster 3	1.4483	.0519	<.001
	Cluster 2 vs. Cluster 3	.3016	.0504	<.001
SELECT	Cluster 1 vs. Cluster 2	-.3021	.1509	.046
	Cluster 1 vs. Cluster 3	.0376	.1302	.773
	Cluster 2 vs. Cluster 3	.3397	.1265	.008

Table 6b. Post Hoc Test for ANOVA testing Equality of Cluster Variables

Variables	Cluster 1 small firms MTS-oriented	Cluster 2 large firms MTO-oriented	Cluster 3 small firms MTO-oriented	Total
EXTCO	3.1810 (0.724)	3.5556 (0.708)	3.3111 (0.735)	3.3418 (0.735)
INFO	3.2759 (0.801)	3.4841 (0.713)	3.4000 (0.760)	3.3926 (0.759)
COMP	3.0603 (0.767)	3.3016 (0.821)	3.2148 (0.793)	3.2012 (0.796)
cases	58	63	135	256

Table 7. Mean and Standard Deviation (reported in parenthesis) of ERP Outcomes for Each Cluster

ERP Outcomes		Sum of Squares	df	Mean Square	F	Sig.
EXTCO	Between Groups	4.505	2	2.252	4.274	0.015
	Within Groups	133.338	253	0.527		
	Total	137.843	255			
INFO	Between Groups	1.326	2	0.663	1.153	0.317
	Within Groups	145.470	253	0.575		
	Total	146.796	255			
COMP	Between Groups	1.811	2	0.905	1.435	0.240
	Within Groups	159.579	253	0.631		
	Total	161.390	255			

Table 8a. ANOVA testing Equality of ERP Outcomes across the three clusters

	I J	Mean Difference (I – J)	Std. Error	Sig.
EXTCO	Cluster 1 vs. Cluster 2	-0.3745	0.1321	0.005
	Cluster 1 vs. Cluster 3	-0.1301	0.1140	0.255
	Cluster 2 vs. Cluster 3	0.2444	0.1108	0.028

Table 8b. Post Hoc Test for ANOVA testing Equality of ERP Outcomes across the three clusters

CONCLUSION

The major implication of this study lies in its findings. The Cluster Analysis results suggest that company size (i.e., number of employees) and production approach (i.e., portion of items being produced in the MTS vs. MTO fashion) are useful variables for grouping manufacturing firms into clusters of similar characteristics. This result is consistent with the argument that the number of product offerings goes hand-in-hand with the shift from MTS approach to MTO approach (Gupta and Benjaafar, 2004) and that large firms would offer higher product variety than small firms would. Furthermore, the ANOVA results suggest that those Korean manufacturing companies in the 'large firms with MTO-oriented' cluster reported significantly higher perceived benefits in EXTCO than the smaller manufacturing firms in the other two clusters did.

This study, like other studies, is not free of limitations. First, it was conducted in only one industry of one country (i.e., Korean manufacturing firms). Thus, further studies conducted in other industries and/or other countries would be useful. Second, the study used perception data collected by self-reporting instrument. Although test of common method variance showed better result than those of some previous studies (Song and Zahedi, 2005; Straub, Limayem and Karahanna, 1995), a study using more objective measures may reduce method variance and allow more generalizability of the results of this study. Third, this study did not address nonresponse bias. Thus, future research that addresses nonresponse bias should be conducted. Finally, although the results of several reliability tests indicated a reasonably high level of instrument reliability, Cronbach's Alpha (α) values of some constructs in the measurement model were not higher than the cutoff point of 0.70 (Nunnally, 1978) and, for one construct, its CR was not higher than the recommended threshold of 0.70 (Fornell and Larcker, 1981; Hair et al., 1998; Segars, 1997).

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Appendix A. Confirmatory Factor Analysis Result

Constructs	Items	loading	t-value	R^2
External Coordination (EXTCO)	Improved coordination with customers (CUST)	1.118	9.625	0.710
	Improved coordination with suppliers (SUPPLY)	1.000		0.746
Competitive Impact (COMP)	Link to global activities (GLOBAL)	1.000		0.559
	Gain strategic advantage (STRADV)	0.830	5.844	0.465
Informational Impact (INFO)	Quality of information (QUAINFO)	1.019	4.930	0.474
	Availability of information (AVAINFO)	1.000		0.605
Process re-configuration vs. Software Customization (MODIFY)	Distribution / Logistics (DLModule)	0.990	13.654	0.685
	Material Management (MMModule)	1.088	14.411	0.828
	Production Planning (PPModule)	1.000		0.618

Loading is the Non-Standardized Regression Weight.
R^2 is the Squared Multiple Correlations.