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Modeling organizational and information systems for effective strategy execution

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Abstract

Purpose – The purpose of this paper is to develop a model of automate for effective strategy execution.

Design/methodology/approach – Both exploratory and confirmatory modes of research using exploratory factor analysis, total interpretive structure modeling, and *t*-test techniques have been conducted.

Findings – In the context of effective strategy execution, the organization support system has most driving power affecting appropriateness of other automate systems. On the other hand, the effective design and deployment of control and monitoring system dependent on other systems. The control and monitoring directly affects the success of strategy execution while the other systems affect execution through structural mediation suggested by the proposed model.

Research limitations/implications – Though this study adopts multiple research methods, a comparatively large sample size would be more useful. The study also faces subjective limitation of the research context. There is possibility of participant's biases while responding to five-point scale questionnaire.

Practical implications – The driving-dependence linkages among the automate systems helps in developing appropriate managerial action plan to convert strategic goals into the results. The model helps in institutionalizing the systems as well as making them effective while linking them in structured relationship. Additionally, the integrated understanding of the automate systems helps promote a sense of purpose and shared meaning of systems among the key stakeholders, which smoothen the execution process.

Originality/value – This study reviews and factorize different automate systems and identifies structured linkages among them to demonstrate the relative criticality of each systems and how effective development of one system leads to the effectiveness of other system. This study also adds methodological value extending triangulation along with the interpretative tool.

Keywords Information system, Strategy execution, TISM, Automate, Organization system

Paper type Research paper

1. Introduction

Scholars of strategy management, especially over the last decade, have demonstrated that strategy execution is as important as its formulation for organizational success (Bossidy and Charan, 2002; Hrebiniak, 2006; Li *et al.*, 2008). However, there has been significantly more research on strategy formulation than on execution (Noble, 1999; Hrebiniak, 2006; Srivastava and Sushil, 2013). Strategy drives the long-term direction of an organization, and the strategy execution process converts strategic objectives into results.

Li *et al.* (2008) noted that strategy execution has been defined broadly from three perspectives: process, or as a sequence of carefully planned consecutive steps; action or as a series of more or less concerted actions, examining these actions from a behavioral perspective; and hybrid, a combination of the two. Rho *et al.* (2001) identified another,

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the gap perspective, or gap variables that indicate inconsistency between strategy and execution, which are more important than either type of variable in identifying better-performing organizations. Kaplan and Norton (1996) proposed a system perspective, where ineffective strategy execution is more often caused by a poor management system than lack of managerial competence or efforts. Noble (1999) suggested a structural perspective, looking at the effects of structural mechanisms on strategy execution processes and outcomes.

Different perspectives highlight different constructs and their associated variables affecting strategy execution. Kaplan and Norton (2006) pointed out there is no perfect structural solution to facilitate effective execution of a strategy. They suggested utilizing a system approach to for ensure achieve effective execution. With advances in technology, especially information technology (IT), organizations started designing and deploying IT-based systems to improve performance. The organizations have been trying to standardize the organization as well as information systems (IS). The construct "Automate" reflects the systems perspective. The "Automate" suggests alignment among the systems to build a systemic mechanism to operationalize strategy execution processes. These systems may include, for example, plan and performance management (PPM), monitoring and control (CMC), analytics, and knowledge base. There have been attempts to find linkages among such organizational and information systems. However, there is a lack of framework to demonstrate causal linkages among systems in the context of strategy execution. The literature also suggests that this lack is one of the most fundamental reasons for execution failure (Pascale *et al.*, 1999; Hrebiniak, 2006). This study therefore attempts to identify key variables of Automate' and linkages among these variables. Finally, it tries to develop a model of "Automate" for effective strategy execution.

Liang (1999) explained that organizational systems should be linked to the essence of the business and that each system has to be seen in association with others. However, there have been limited efforts to develop a framework that can help in assessing the relationships and associations. This study argues that there is a hierarchical structural relationship among variables. Effective management of one variable therefore facilitates the effectiveness of others in successful strategy execution. The objective of this study is to develop a model of automate that can be used as a strategic tool for superior strategy execution. This study uses both qualitative and quantitative research approaches. It explains managerial implications and finally presents limitations and directions for future research.

2. Literature review

Even the best strategy fails if its execution is poor. Organizational systems institutionalize and operationalize strategic intent and execution processes (Benjamin *et al.* 1984; Giese 1984; Rackoff *et al.*, 1985; King and Teo, 1996). The need for effective systems in strategy execution is therefore clear. Advances in technology boosted IT-based design and deployment of systems (Fuenmayor, 1991; Cabrera *et al.*, 2008). For example, a computerized decision support system (DSS) is designed to enhance the outcomes of managerial decisions and actions (Sengupta and Te'eni, 1993; Singh, 1998). However, outcomes alone cannot clarify why and how a particular DSS application is more effective than others. This limits the applicability and usefulness of individual systems. It is therefore necessary to identify key systems or variables and develop a framework to explain linkages among them (Todd and Benbasat, 1987; Mackay and Elam, 1992; Mathrani *et al.* 2013).

2.1 Key variables

Identifying variables of automate and their inter-linkages will enable demonstration of an effective action plan for successful strategy execution. For example, Kaplan and Norton (1996) demonstrated linkages among the plan and performance system, the control and monitoring system, and the IS. They argued that identifying and using dependent relationships among organizational systems could be useful in managing execution (Spencer *et al.*, 2009). Deployment of a system is complete when the organization obtains benefits from the system's effective operation. For example, performance measures can be monitored to improve an organizational process (Neely *et al.*, 1994) by focussing on activities that deliver value to customers (Bititci *et al.*, 2001) and ultimately affect the firm's performance. Different automate systems such as analytics and knowledge base (AKB), PPM, or CMC should therefore be institutionalized, i.e. linked with each other and integrated into the routines of the organization (Cooper and Zmud, 1990).

The "automate" framework may facilitate the institutionalization of strategic goals and execution activities (King and Teo, 1996). The need to institutionalize different automate systems underlines the criticality of organization support systems (OSS). These affect strategy execution through other systems. Key components are flow of work to support strategy, e-business in the organization, and standardized functional processes. The review of existing literature and the inputs of corporate practitioners helped in identifying a total of five key variables: organizational support systems (AU_1); IS (AU_2); plan and performance measurement (PPM) system (AU_3); monitoring and control system (MCS) (AU_4); and AKB system (AU_5) (Norman and Shallice, 1985; Walsham and Waema, 1994; Kaplan and Norton, 1996; Ittner and Larcker, 1998; Higgins, 2005; Zheng *et al.* 2010; Mathrani *et al.* 2013; Ahmad *et al.*, 2014). Table I shows the important aspects of each variable, identified from the literature.

2.2 Linkages among key variables

MCS have an immediate effect on execution activities (Silver, 1991). Monitoring and control helps managers to track execution activity, identify potential deviations (Singh and Ginzberg, 1996), and suggest corrective actions to improve execution, using ongoing feedback (Norman, 1981; Norman and Shallice, 1985). The PPM systems aim to identify areas of strategic focus and their criticality for effective strategy execution. It is found that deficiencies in data quality may have several root causes. The technology-task-fit theory suggested that data quality required for monitoring and control are influenced by different organizational systems. Organizations need to adapt continuously their systems addressing contextual issues to improve data quality (Glowalla and Sunyaev, 2014). The PPM system helps in identifying the areas for adaptation of control system. PPM works at two levels. First, it links performance measures with strategic intent by identifying the right combination of strategic performance factors, balancing competing approaches such as financial and non-financial, and short- and long-term (Kaplan and Norton, 1996; Neely, 2005). Second, it shows inter-linkages among strategic performance factors, taking into account the strategic direction of the firm (Ittner and Larcker, 1998; Olson and Slater; 2002). PPM demonstrates when, what, and how to achieve strategic objectives. It also shapes the design and operation of MCS, to keep strategy execution activities on track. PPM therefore provides contextual logic for design and operation of MCS.

With increasing competition, managerial challenges are also increasing, and IS (IS) are becoming more crucial. Over the last two decades, organizations have increasingly

Table I. Variables of automate and important highlights of literature

Variable	Literature highlights	Select references
Organization support systems	The organizational systems institutionalize and operationalize the strategic intent and execution process An effective deployment of the automate systems depends on how well they are embedded in the organization systems and structure The firms, which lack such linkage struggle in even designing and deployment of, automate systems	King and Teo (1996), Lederer and Sethi (1988), Avgerou (2002), Braa *et al.* (2004), and Higgins (2005)
Information systems	With increasing competition the complexities of managerial challenges are increasing, therefore, information systems become crucial Organizations adopt different approaches such as strategic planning of information systems, strategic alignment of organization and information systems, strategic information systems to ensure effectiveness of information systems	Bergeron and Raymond (1991), Segars *et al.* (1998), Hirschheim and Sabherwal (2001), and Hartono *et al.* (2003)
Plan and performance measurement	Plan and performance measurements identify strategic focus areas to be achieved Plan and performance measurements link multiple performance measures with the strategic intent and develop inter-linkages among them It demonstrates when, what and how to achieve strategic objectives to keep execution activities on track	Kaplan and Norton (1996), Ittner and Larcker (1998), Olson and Slater (2002), Neely (2005) and Spencer *et al.* (2009)
Monitoring and control	Monitoring and control tracks execution activity, identifies potential deviations, and suggests corrective action to appropriate execution activities Monitoring and control is driven by plan and performance measurement logics and therefore, should have a different design as per the logic Monitoring and control differentiates in activities that deliver value to customers and ultimately affect the firm's performance	Norman (1981), Norman and Shallice (1985), Silver (1991), Singh and Ginzberg (1996)
Analytics and knowledge base	Analytics and knowledge base helps to decipher changes in and around the organization With increasing number of actions and their interdependency, execution activities become complex and therefore needs sophisticated tools of analytics and knowledge base to take intelligent decision Analytics and knowledge base create a meaningful dialogue between management and operational levels to facilitate the choice for a strategic orientation and its execution	Sengupta and Te'eni (1993), Singh (1998), Nilsson and Rapp (1999)

focussed on IS as a strategic tool to achieve their long-term goals (Hartono *et al.* 2003). Organizations have adopted different approaches such as strategic IS planning (Gottschalk, 1999a; Segars *et al.*, 1998; Teo and Ang, 1999), strategic alignment of organization and information systems (Reich and Benbasat, 2000; Hirschheim and Sabherwal, 2001; Sabherwal and Chan, 2001), and strategic IS (Bergeron and Raymond, 1991; Hamilton, 1999; Enns *et al.* 2003; Lee and Pai, 2003). A misalignment of IS with organizational support systems restricts anticipation of design and deployment problems during the planning process (Lederer and Sethi, 1988; Lee and Pai, 2003). The effectiveness of an IS depends on how well it is embedded in the organizational structure (Avgerou, 2000, 2002; Braa *et al.* 2004; Mathrani, 2013). The key to achieving effective strategy execution is therefore to link IS with organizational support systems such as flow of work, e-business processes, and standardized functional processes (Venkatraman, 1994; Galliers *et al.* 1995). Many scholars have demonstrated that organizations fail to implement IS successfully if they are not appropriately linked with work tasks and job descriptions (Walsham and Waema, 1994; Segars *et al.*, 1998; Hartono *et al.*, 2003; Wade and Hulland, 2004). For example, in a public firm, which has a rigid organizational structure, IS should be designed to work in a less flexible work context (Caudle *et al.*, 1991).

Bergeron and Raymond (1991) demonstrated that IS significantly affect a firm's value chain, i.e. the organization's relationship with suppliers, customers, and competitors, by focussing the strategic orientation more effectively, so that the firm concentrates on particular issues such as differentiation, cost, and innovation. IS improve effectiveness of monitoring and control and, at the same time, strengthen the sophistication of AKB development. The knowledge systems are becoming diverse and heterogeneous with many overlapping. Organizations cannot assess the complementarity of several knowledge systems unless they are linked with the fundamental organizational and information systems (Lezcano *et al.*, 2012). Increased complexity in a strategy increases the challenges in execution. Long-term goals therefore need to be cascaded into short-term objectives to reduce these challenges. This requires identification of appropriate strategic performance measures and elimination of non-strategic activities (Kaplan and Norton, 1996; Hrebiniak, 2008).

Strategy execution also becomes more complex with increasing number of activities and their interdependency. The use of analytics in handling complex action plans is also critical (Sengupta and Te'eni, 1993; Singh, 1998; Zheng *et al.*, 2010). AKB also help in effective decision making, based on inputs from the environment such as changing customer choices and market dynamics. For example, organizations use market intelligence tools to link strategic intent with the changing economic and market dynamics. The complexity of decision making and managerial activities reflects challenges in effective strategy execution. The analytics and information systems facilitate a meaningful dialogue between management decisions and operational activities. Such dialogue generates choices for strategic orientation and effective execution through PPM and MCS (Nilsson and Rapp, 1999).

3. Research questions and objective

For long-term sustainability and competitive advantage, the literature clearly needs two-fold research on automate: linking "automate" variables with strategy, i.e. identifying the right combination of variables and understanding causal linkages among these variables. Previous research has identified "automate" variables of strategic importance. However, there is a lack of research demonstrating driving-dependence relationship among these variables, which could help managers to develop appropriate action plans for effective execution. This study has therefore identified the following research questions:

RQ1. What are the important variables of "automate" for effective strategy execution?

RQ2. How are these variables inter-linked?

RQ3. What is the empirical validity of inter-linkages among these variables?

These have led to the research objective:

- to develop a model of automate for effective strategy execution.

4. Research methodology

This study uses multiple methods approach combing both the qualitative and quantitative research routes to unearth more complete picture of the phenomenon. This helps in facilitating accurate, generalizable, and practically useful theory. Starting with systemic literature review, this study conducts initial exploratory analysis and finally, builds on that using empirical and interpretive analysis. This study also adds methodological value extending triangulation along with the interpretative tool. The interpretation of the statistically tested model is an innovative experiment to clarifies not only "what" and "how" but also the "why" aspect of theory building.

The literature review included articles with at least ten citations on the Google Scholar database, as at May 30, 2012, plus some articles from the last three years and others deemed important. Google Scholar is more comprehensive than Thomson-ISI for management studies (Harzing and Wal, 2008). To factorize automate variables, we conducted exploratory factor analysis (EFA) on 182 responses from corporate practitioners in different industries based in India. The questionnaire was designed and administered in English, which is the official language of the Indian corporate world. The response rate to the survey was around 20 percent. The initial response to an online survey was particularly low, so almost half of the responses were personally administered to increase the response rate. Random and convenience sampling techniques were used for data collection, ensuring respondents from a variety of backgrounds and experience (see Table II). The domain of the study was the

Criteria	Respondents' profile
Sectors	ICT (27.1%), power (12.5%), consulting (10.4), banking (8.3%), construction (8.3%), and others
Functional areas	Operation (33.3%), IT (14.6%), planning (10.4%), marketing (10.4%), HR (4.2%), consulting (4.2), and others
Hierarchical level	Lower management (35.4%), middle management (35.4%), top management (29.2%)
Total work experience (years)	Minimum (3), maximum (28), mean (13.5), SD (8)
Experience in the current organization (years)	Minimum (1), maximum (27), mean (8.5), SD (7)
Planning/coordination/execution	Planning (29.2%), coordination (20.8%), execution (50%)
Leadership role	Leadership role (70.8%), non-leadership role (29.2)

Note: $n = 182$

Table II. Profile of respondent of factor analysis study infrastructure sector, with a focus on power, telecom, and transportation firms. The intended population is therefore firms operating in these sectors in India. Purposive and judgmental sampling was used to ensure at least 50 responses from each sector. SPSS-16 was used for data analysis. EFA was used to examine the structure of overlapping variation between measures (Leeflang *et al.*, 2000) and group them into main factors according to the similarity of their impact. The principal components method was used to extract factors, followed by varimax rotation to maximize the variance of square loading across measures subject to the constraint that the communalities of each variable remained the same (Johnson and Wichern, 1998).

Scholars have developed and applied structural models such as interaction matrices and graphs (Warfield, 1974), delta charts, and signal flow graphs. However, they lacked any practical interpretation of the phenomena observed. Interpretive structure modeling (ISM) (Warfield, 1974) and total interpretive structure modeling (TISM) (Sushil, 2012) fill this gap by systematic iterative application of graph theory. Many scholars have applied ISM tools to management issues (Sharma *et al.*, 1995; Kanungo and Bhatnagar, 2002; Thakkar *et al.*, 2007; Srivastava and Sushil, 2013). ISM indicates the direction of the relation in a paired comparison, but the interpretation of the operation of the directed links is not explicit. The TISM technique addresses this limitation by using an interpretive matrix (Sushil, 2005), where, during data collection, experts are asked to explain how one variable (AU_1) influences another (AU_2) (see Table III). This study used the TISM technique to develop a model of automation to show the causal linkages among the variables. The central tools of ISM, the reachability matrix and its partitions, were used in the TISM process (Sushil, 2009, Nasim 2011). The ISM survey was conducted using the detailed interviews from 50 corporate practitioners in India. The average experience of the participants was 9.3 years, and they were drawn from 12 industries. The participants were asked to provide their interpretation of all the linkages (Appendix 1). The interpretation enriches the TISM model by reflecting on its application (Chandra and Suri, 2011; Corley and Gioia, 2011; Goyaland Grover, 2012).

Finally, in order to validate the framework of the model, an idea engineering exercise was conducted, eliciting responses to a structured questionnaire (Appendix 2) from corporate practitioners. The questionnaire was developed using a five-point Likert scale, where "1"denoted strongly disagree and "5" strongly agree. The judgmental sampling technique was adopted by using the criteria "variety of the sectors," "coverage of all functional areas," and "respondents" involvement in planning/execution/coordination'. In total, 48 practitioners with substantial experience and understanding of the subject area responded to the structured questionnaire. The questionnaire was personally administered to ensure higher validity of the responses. A one-sample *t*-test was used

Table III.
Elements, contextual relation, and variables of automate in strategy execution

Element code	Element	Contextual relation	Interpretation
AU_1 AU_2 AU_3 AU_4 AU_5		Automate factor X will influence/enhance Automate variable Y	How or in what way will Automate variable X will influence/enhance Automate variable Y?

to compare the mean value of each of the linkages in the framework with a test value. Since the survey participants' responses ranged from "strongly disagree" (1) to "strongly agree" (5), a test value of a mean of more than three seemed to be reasonable for hypothesis testing. The basic hypothesis for validating the framework was:

H0. There is no significant difference between the observed mean and specified mean value for acceptance of the linkages among the variables.

H1. There is a significant difference between the observed mean and specified mean value for acceptance of the linkages among the variables (alternative hypothesis).

The linkages among the variables would therefore be accepted if the significance value for the *t*-statistic was less than 0.05 (95 percent confidence interval).

5. Findings and discussion

There are many processes and mechanisms suggested for effective strategy execution, such as application of e-business, enterprise resource planning (ERP), market intelligence tool, balanced scorecard (BSC), and DSSs. These processes and mechanisms form different variables that help in converting strategic goals into execution outcomes. Results of the EFA demonstrate that there are broadly five factors (Table IV), namely organizational support systems (OSS) (AU_1); IS (AU_2); PPM systems (AU_3); MCS (AU_4); and AKB (AU_5). The results of EFA shows that monitoring and control is emerging very important as the factor loading of both the items are more than eight which is very high. Under PPM, the items related to use of BSC and dashboard is highly acknowledged by the respondents as their values are also more

Micro variables	Components	FL	IC	ID
Organizational systems support	Proper work flow to support strategy	0.778	3	0
	e-Business is well in place	0.715		
	Structured and standardize functional processes	0.787		
Information systems and control	Enterprise wide information systems	0.717	3	0
	Business solutions are standard and suited to costumer's need	0.689		
	Appropriate information security mechanism	0.731		
Analytics and knowledge base	Data warehousing and data mining	0.756	4	0
	Efficient use of decision support systems	0.500		
	System of automation of reports	0.806		
	Efficient use of market intelligence tools	0.682		
Plans and performance measurement system	Efficient use of strategic planning systems such as BSC	0.825	3	0
	Efficient use of operating planning systems such as dash board	0.875		
	Standardized and automated functional area plans	0.660		
Monitoring and control systems	Company tracks and measure the results	0.889	2	1
	Control system to achieve strategic objectives	0.807		

Notes: KMO = 0.735; χ^2 = 346.61; Sig. = 0.000; CL = 71.34. FL, factor loading; IC, item confirmed; ID, item dropped

Table IV. Results of exploratory factor analysis than eight. The efficient use of intelligence tool is not scoring very high on factor loading. This implies that mere implementation of intelligence tool may not guarantee superior performance. Overall, all the items identified under respected variables are well within the standard statically range and justify their role. The KMO value of more than 0.7 and significance of 0.00 strengthen the factorization. All but one item was confirmed. As shown in Table IV, the monitoring and control items have the highest factor loadings, reflecting a high level of acceptability. Similarly, the use of BSC and dashboard as a planning and performance measurement tool seem to be more popular, as factor loadings were also high in these cases.

There has been considerable research reflecting on the application of these systems to achieving organizational success. However, the literature also shows poor utilization of these systems. An isolated observation of these systems, without linking with other systems, is one of the biggest reasons for their lack of application. The TISM exercise, based on the reachability matrix and level partitioning, demonstrates hierarchical structural linkages among the factors. Table V shows how each variable affects others and is affected by them. Table V also shows the level of dependence and driving power of each variable. For example, AU_4 (monitoring and control) is at level 1, so has the highest dependence on other variables. $AU_{1,}$ at level 4, is the strongest driver shaping organizational and information systems.

The hierarchical structural relationship, as shown in Figure 1, may help managers to prioritize and systemize the design and deployment activities of automated systems. The TISM model of automation shows that organizational support systems are the most powerful driving factor affecting other systems. This supports previous studies suggesting that the organization is the most important context for developing and deploying any system to facilitate strategy execution (Galliers *et al.* 1995; Lee and Pai, 2003). MCS emerge as the most dependent factor. This shows that different automated systems all ultimately affect execution activities through this factor. For example, PPM systems, with their clarity on the strategic focus of an organization, shape design, and deliverables for monitoring and control. IS, with the highest driving power after organizational support systems, influence the effectiveness of PPM, AKB, and MCS.

This study further validates the TISM model of automation using the *t*-test to strengthen the acceptability of the model (Shah and Corley, 2006). The *t*-test analysis reveals a strong validation of the model, as all the linkages were found to be statistically valid (Table VI). The *t*-test results also reveal the importance of organizational support systems and IS in shaping other systems. The findings support previous studies that

Table V.
Interaction matrix, reachability matrix, and level partitioning of the factors of automate

	AU_1	AU_2	AU_3	AU_4	AU_5	Reachability	Antecedence	Intersection	Level
AU_1 (organizational support system)	1	1	1	1	1	1,2,3,4,5	1	1	4
AU_2 (information systems)	0	1	1	1	1	2,3,4,5	1,2	2	3
AU_3 (plan and performance measurement systems)	0	0	1	1	1	3,4,5	1,2,3,5	3,5	2
AU_4 (monitoring and control systems)	0	0	0	1	0	4	1,2,3,4,5	4	1
AU_5 (analytics and knowledge base)	0	0	1	1	1	3,4,5	1,2,3,5	3,5	2

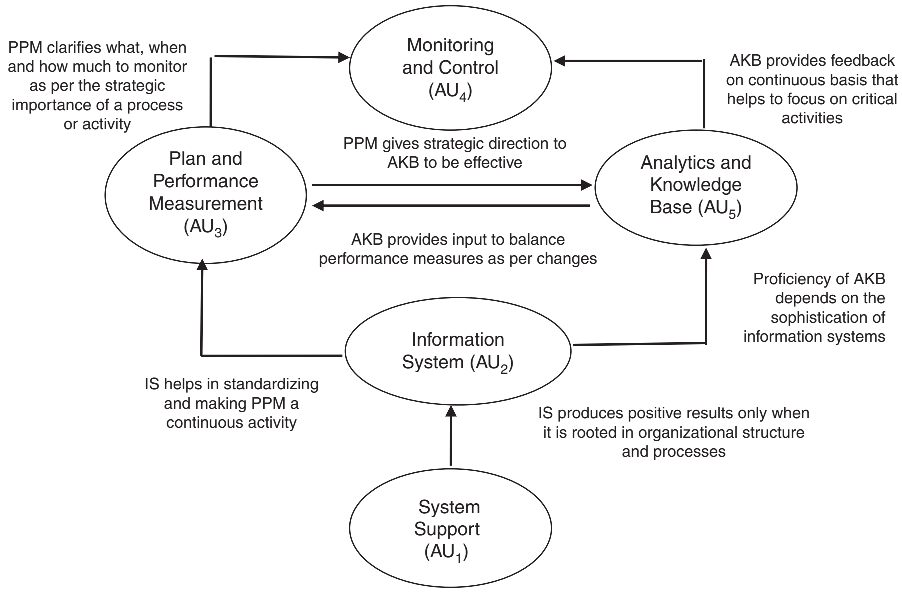

Figure 1.
TISM model of automate

Linkage	Mean	Median	Mode	SD	t	Sig.
AU_1–AU_2	4.21	4.25	4.00	0.71	11.74	0.00
AU_1–AU_3	4.02	4.03	4.00	0.70	10.11	0.00
AU_1–AU_4	4.13	4.16	4.00	0.73	10.63	0.00
AU_1–AU_5	3.94	3.94	4.00	0.81	8.02	0.00
AU_2–AU_3	3.85	3.86	4.00	0.82	7.17	0.00
AU_2–AU_4	3.94	3.97	4.00	0.81	8.02	0.00
AU_2–AU_5	4.19	4.20	4.00	0.57	14.41	0.00
AU_3–AU_4	4.15	4.19	4.00	0.68	11.61	0.00
AU_3–AU_5	4.08	4.11	4.00	0.71	10.58	0.00
AU_5–AU_3	3.92	3.91	4.00	0.79	7.99	0.00
AU_5–AU_4	4.10	4.15	4.00	0.72	10.60	0.00

Note: $n = 48$

Table VI.
One sample *t*-test of automate framework

focus on development of IT systems and how organizations can implement them to improve performance (Lederer and Sethi, 1988; Sharma and Yetton, 2003; Wade and Hulland, 2004). The linkages that have lowest standard deviation, i.e. highest consensus among the respondents are:

- IS (driver) - PPM system (dependent);
- supports systems (driver) - AKB (dependent); and
- IS (driver) - monitoring and control (dependent).

It is clear that the practitioners found that the information and organizational support systems have a deciding role in the effectiveness of PPM, AKB, and monitoring and control. As it is referred in the literature review and discussion in the managerial implications, the contemporary tools of business analytics and knowledge management have to be grounded in the core systems of the organization to reap better results. The high *t*-value shows the power of influence. The *t*-value reflecting the linkages between "AKB" and "PPM" shows critical role of analytics and knowledge to identify key strategic performance areas and finally shape up the PPM systems. However, the reverse may not be equally convincing. The organizational support systems emerged as most fundamental and important with highest *t*-values. The next section explains the implications of these results.

6. Implications of TISM model of automate

Previous studies have discussed organizational and information systems in an isolated manner, which, in turn, limits successful deployment of systems. The shift in strategic management from a microeconomic approach (Porter, 1980) to a networks approach supports the central argument of this study that connectivity among the key systems and actors both within and outside the organization is required for sustained competitiveness through effective strategy execution (Gulati *et al.*, 2000). The network approach argues for effective linkages among systems to address a fast-changing environment. Networks are purposeful organizational arrangements to obtain competitive advantage (Jarillo, 1988; Gulati *et al.* 2000). An integration of strategic management processes with network approaches would help to address key challenges in strategy execution. The TISM model building in this study takes forward the network approach, especially at a strategic level.

TISM model of automation suggests that effectiveness of a system for successful strategy execution depends on understanding how each system influences others. A lack of understanding may have negative consequences for the system's effect on performance, even if the design is good (Orlikowski, 2000). For example, flow of work and job design affect task-related centralization using computerized systems, which shape PPM and monitoring and control. If an organization wants to improve innovation among employees then it needs first to adapt organizational support systems, before decentralizing IS, and identifying strategic performance measures to be monitored. When designing systems, organizations should therefore link them for effective implementation (Walsham and Waemaa, 1994). The following sections briefly discuss the managerial implications of dependence linkages among the variables. The most dependent variable is discussed first and the variable with the most driving power is discussed last.

6.1 MCS (AU_4)

The effects of MCS on the development of new ideas and initiatives within the firm are little documented (Marginson, 2002). The TISM model shows that these systems have a direct effect on strategy execution. The design and deployment of these systems is affected by all other automated systems. The immediate backward linkage of MCS is with PPM systems. This is unsurprising as many scholars have pointed out the dysfunctional effects of traditional feedback systems as tools of strategy execution (Otley, 1978; Brownell, 1981; Brownell and Dunk, 1991; Bititci *et al.*, 2001) and underlined a need to develop linkages among the automated systems (Mintzberg, 1987; Bititci *et al.*, 2001; Srivastava and Sushil, 2013). A clear understanding of linkages of MCS with other systems facilitates appropriate managerial action to actualize long-term strategic goals (Burgelman, 1991). For example, managing quality is necessary in today's complex business environment. However, managing quality data depends on different organizational systems. Therefore, organizations should strive to adapt their systems considering the contextual realities (Glowalla and Sunyaev, 2014). A focussed PPM system helps in identifying key strategic areas to facilitate adaptation of system such as of monitoring and control. Top management should therefore focus on designing OSS and IS, which have higher driving power, and help middle managers to design MCS to keep execution activities on track (Simons, 1994, 1999; Dutton *et al.*, 1997).

6.2 PPM systems (AU_3)

Though there are plenty of studies on planning and performance measurement systems, there are limited attempts to show how they can ensure effective strategy execution. Each strategy is unique and requires different sets of performance measures. For example, "defender" firms rely more on financial measures, but "prospectors" place greater emphasis on non-financial measures (Ittner and Larcker, 1998; Olson and Slater, 2002). An effective PPM system identifies the right combination of strategic performance measures, balancing different approaches, including financial and non-financial, short- and long-term, and lead and lag factors (Kaplan and Norton, 1996; Neely, 2005; Burgess *et al.*, 2007). The strategic performance measures propose key focus areas to monitor and control, and provide feedback on execution activities. Balanced PPM, aligned with OSS, provides accurate information on competencies and resource allocation to facilitate effective monitoring and control of strategy execution (Prahalad and Hamel, 1990; Bromwich and Bhimani, 1994; Tatikonda and Tatikonda, 1998). The emergence of the BSC approach (Kaplan and Norton, 1996) was a major step in developing effective PPM. Different scholars have further extended and contextualized this approach (McAdam and O'Neill, 1999; Norreklit, 2000; Sushil, 2008).

6.3 IS (AU_2)

IS have evolved from their traditional role of administrative support to take a strategic role in organizations. They have also graduated from technological to managerial and organizational questions, and consequently, greater focus has been given to how context and systems interact (Benbasat *et al.*, 1987). For example, airline reservation systems were very innovative technical achievements in the early 1960s. They have become a key competitive factor in the changing airline industry over the last few years. Scholars have therefore explored the potential of IS to improve organizational effectiveness as well as strategy execution. In any organization, information is scattered throughout the network. IS identifies major information categories used within a firm and their relationships to business processes. As demonstrated in the TISM model, IS have backward linkages with organizational support systems and forward linkages with PPM and monitoring and control (Henderson *et al.*, 1993). For example, a software can neither be integrated across functions nor distributed across networks without a clear understanding of organizational support systems such as flow of work (Brancheau *et al.*, 1996).

6.4 AKB (AU_5)

Organizations' data resource is growing in size, complexity, and value. Recent research on data mining has emphasized that organizational data are still largely unrecognized, inaccessible, and underutilized. IS represent harder aspects, and AKB softer aspects, of strategic information management (Brancheau *et al.*, 1996; Ogulin *et al.*, 2012). With increasing market and competition pressure, organizations need to change their business propositions and processes. Analytics helps managers understand the changes within and outside the organization, by analyzing complex data sets and suggesting managerial action plans. For example, many companies are using market intelligence tools to track changing customer preferences and identify strategic performance measures for effective strategy execution. At the same time, analytics can provide input to any process redesign required for effective execution. With the increasing business and environment complexities, the organizations tend to use knowledge systems that are diverse and heterogeneous. The organizations are struggling to address complementarity of several knowledge systems (Lezcano *et al.*, 2012). The findings of this study support the argument of connecting knowledge systems with the fundamental organizational and IS. It is established that it is not knowledge itself but the organization's ability apply knowledge that affects performance and competitiveness of a firm. An organization should renew its knowledge base through its dynamic capabilities to respond to environmental changes (Zheng *et al.* 2011). The TISM model supports the argument that the organizations can achieve execution results by enhancing knowledge base and monitoring and control (Tseng and Lee, 2014).

6.5 Organizational support systems (AU_1)

The dramatic changes in business environments, increasing involvement of end users, and drastic changes in technology development have all shortened the planning cycle and organizations therefore have to be increasingly flexible. Aligning IS with organizational support systems is among the most critical issues for effective strategic planning and execution (Brancheau *et al.*, 1996). Examples include ERP, integrating enterprise-wide IS, and automating core functional activities such as manufacturing, human resources, and supply chain (Edmondson *et. al.*, 1997; Datamation, 1998; Ogulin *et al.*, 2012). However, in many cases, ERP fails to deliver its strategic objectives because there is a misfit between the design of the organization's core business processes, and the design of the ERP software (Davenport 1998; Holland and Light, 1999). An ERP system aligned with organizational systems can significantly improve performance of supply chain in terms of integrating internal business processes, enhancing information flow among departments of the organization, and collaborating with outsourcing suppliers, customers, and other strategic partners (Shatat and Udin, 2012). An organization's inclination for change should therefore direct its choice of IS strategy. For example, with huge environmental changes, organizations may opt for a bespoke development. However, the success of this will depend on the organization's flexibility to change its business processes to fit the software, or change the software to fit the business processes (Brancheau *et al.*, 1996). Strong linkages among legacy systems, business processes, and IT systems will ensure effective execution of the strategy (Roberts and Barrar, 1992; Bennett 1994; Adolph, 1996).

7. Contribution of this study

There are few studies discussing the role of organizational and IS in the context of strategy execution. For example, Chenhall and Langfield-Smith discussed the role of planning and performance measurement, especially in emerging economies such as India, in strategy execution, but only in a limited way. Organizations have to be flexible to tune their processes and systems to changes in the external environment. The emerging business environment is now characterized by speed and flexibility (Stalk, 1988). Organizational flexibility in bringing in changes in support systems shapes other systems. Though components of different systems can be identified separately for analytical purposes, they are invariably interconnected in practice. A new management framework is required to integrate and balance changes in different management and operational systems (Kaplan and Norton, 1996).

The TISM model developed in this study should help in interpreting events and actions as they occur. An integrated understanding of automated systems will help promote a sense of purpose and shared meaning of systems among the key stakeholders. For example, it is important for managers to understand how changes in basic workflow, such as reengineering, affect IS, AKB, and monitoring and control. The environmental changes force organization to be more agile for competitive success as well as survival (Luftman and Ben-Zvi 2010). The organizational and IS give organizations for strong alignment and at the same time an ability to be agile. The IS and analytics are critical for agility. On the other hand, the work system and performance measurement system helps organizations in alignment. Therefore, an alignment of organizational/IS also provide for flexibility (Tallon and Pinsonneault, 2011).

A lack of participation and consensus among the groups associated with each system leads to slow progress. This can become serious turbulence in achieving competitive performance. The literature on strategy execution highlighted that consensus is important to achieve superior financial and non-financial performance. Person-organization fit theory demonstrates that higher level of consensus positively affect employees' satisfaction. Organization can use analytics to build consensus and knowledge base across the organization (Ho *et al.*, 2014). A lack of such exercise may result in poor performance despite use of sophisticated performance management tools such as BSC. The proposed TISM model suggests that the AKB should be effectively used to communicate strategic choices and execution approach throughout the organization to achieve higher involvement of employees and consensus. The linkages among different systems reduce resistance and facilitate participation of different groups. Such participation enables the rapid development of a consensus and a clear way forward for effective strategy execution.

This study has reviewed different organizational and IS in the context of effective strategy execution. It has also identified linkages among the systems to demonstrate their relative criticality and how effective development of one system leads to effectiveness of others. For example, it is found that involvement of front line managers and end-users are critical for streamlining execution activities. Mapping pattern accurately is the key rather than having multiple iterations for correction. The ERP-based mechanism can be successful only if organizations go for business process reengineering aligning ERP with work systems of the organization (Garg and Agarwal, 2014). The organizational structure determine implementation of organizational and information systems. Organizations are using contingent approach to make structural choices. The structural choices should be manifested in PPMs. However, the choice of structural form to support a complex inter-functional system such as ERP requires solving many complex simultaneous organizational problems. Therefore, an understanding such as reflected in TISM model can help achieving superior execution of strategic plans. Even the latest research on information security management highlights that managing information assets through best practices decides effectiveness of information management. This study also argues that accurate monitoring and control of execution activities require sound management of IS (Singh *et al.* 2014). The proposed model could be useful in providing a holistic understanding of systems, to convert strategic goals into outcomes. This study also adds methodological value, extending triangulation along with the interpretative tool. The interpretation of nodes and links in the ISM framework is an innovative experiment that clarifies not only "what" and "how," but also "why."

8. Limitations and suggestions for future research

It is difficult to make universal prescriptions about appropriate system design. Though this study has attempted to synergize multiple research methods to increase the significance of the findings, a larger sample size would have increased the reliability of the results. Time and resources are also obvious limitations of the study. Variables are contextual to organizations and validating this study's findings would therefore require extended research in different settings. It is also possible that bias has arisen from participants responding to the five-point scale questionnaire, which may limit the insight. A further qualitative or quantitative study could draw on expert opinions to improve the acceptability and applicability index of the research findings. In the TISM study, where there were disagreements among respondents, the majority view was taken. This may have restricted the results, and could be improved by multiple discussions with the respondents, possibly in larger groups.

The limitations of this study suggest further research in different contexts. Such alternative thinking could be useful to further test the proposed model in different research settings and bring new insights. The scope of this study has been limited to understanding connectivity among organizational and IS. The study has not covered network strategies that focus on inter-organizational connectivity. The industrial network approach demonstrates that the organization and its interface with the environment should be viewed in a network context (Håkansson and Snehota, 1989). The network strategy helps to strengthen a firm's inter-organizational power or position, leading to effective strategic action within a business network. This research can be extended to focus on both inter-organization connectivity and wider organization-environment connectivity.

References

Adolph, W.S. (1996), "Cash cow in the tar pit: reengineering a legacy system", *IEEE Software*, Vol. 3, May, pp. 41-47.

Ahmad, N., Haleem, A. and Syed, A.A. (2014), "Study of reasons for enterprise systems adoption among Indian organizations", *Journal of Enterprise Information Management*, Vol. 27 No. 6, pp. 696-718.

Avgerou, C. (2000), "IT and organizational change: an institutionalist perspective", *Information Technology & People*, Vol. 13 No. 4, pp. 234-262.

Benbasat, I., Goldstein, D.K. and Mead, M. (1987), "The case research strategy in studies of information systems", *MIS Quarterly*, Vol. 11 No. 3, pp. 369-386.

Benjamin, R.I., Rockart, J.F., Scott Morton, M.S. and Wyman, J. (1984), "Information technology: a strategic opportunity", *Sloan Management Review*, Vol. 25 No. 3, pp. 3-10.

Bennett, K. (1994), "Legacy systems: coping with success", *IEEE Software*, Vol. 12 No. 1, pp. 19-23.

Bergeron, F. and Raymond, L. (1991), "Identification of strategic information systems opportunities: applying and comparing two methodologies", *MIS Quarterly*, Vol. 15 No. 1, pp. 89-103.

Bititci, U.S., Suwignjo, P. and Carrie, A.S. (2001), "Strategy management through quantitative modeling of performance measurement systems", *International Journal of Production Economics*, Vol. 69 No. 1, pp. 15-22.

Bossidy, L. and Charan, R. (2002), *Execution: The Discipline of Getting Things Done*, Random House Business Books, London.

Braa, J., Monteiro, E. and Sahay, S. (2004), "Networks of action: sustainable health information systems across developing countries", *MIS Quarterly*, Vol. 28 No. 3, pp. 337-362.

Brancheau, J.C., Janz, B.D. and Wetherbe, J.C. (1996), "Key issues in information systems management: 1994-95 SIM delphi results", *MIS Quarterly*, Vol. 20 No. 2, pp. 225-242

Bromwich, M. and Bhimani, A. (1994), *Management Accounting: Pathways to Progress*, CIMA Publishing, London.

Brownell, P. (1981), "Participation in budgeting: locus of control and organizational effectiveness", *The Accounting Review*, Vol. 56 No. 4, pp. 844-860.

Brownell, P. and Dunk, A.S. (1991), "Task uncertainty and its interaction with budgetary participation and budget emphasis: some methodological issues and an empirical investigation", *Accounting, Organizations and Society*, Vol. 8 No. 8, pp. 693-703.

Burgelman, R.A. (1991), "Intra-organizational ecology of strategy making and organization adaptation: theory and field research", *Organization Science*, Vol. 2 No. 3, pp. 239-262.

Burgess, T.F., Ong, T.S. and Shaw, N.E. (2007), "Traditional or contemporary? The prevalence of performance measurement system types", *International Journal of Productivity and Performance Management*, Vol. 56 No. 7, pp. 583-602.

Cabrera, D., Colosi, L. and Lobdel, C. (2008), "Systems thinking", *Evaluation and Program Planning*, Vol. 31 No. 3, pp. 299-310.

Caudle, S.L., Gorr, W.L. and Newcomer, K.E. (1991), "Key information systems management issues for the public sector", *MIS Quarterly*, Vol. 15 No. 2, pp. 171-188.

Chandra, P.U. and Suri, R.K. (2011), "Modeling of continuity and change forces in private higher technical education using total interpretive structural modeling (TISM)", *Global Journal of Flexible Systems Management*, Vol. 12 Nos 3-4, pp. 31-40.

Cooper, R.B. and Zmud, R.W. (1990), "Information technology implementation research: a technological diffusion approach", *Management Science*, Vol. 36 No. 2, pp. 123-139.

Corley, K.G. and Gioia, D.A. (2011), "Building theory about theory building: what constitutes a theoretical contribution", *Academy of Management Review*, Vol. 36 No. 1, pp. 12-32.

Datamation (1998), "Implementing R/3", *Datamation*, available at: http:\\Datamation.com/PlugIn/toolkits/implr3/diary1.htm (accessed January 15, 2013).

Davenport, T.H. (1998), "Putting the enterprise into the enterprise system", *Harvard Business Review*, July-August, pp. 121-131.

Dutton, J.E., Ashford, S.J., O'Neill, R.M., Hayes, E. and Wierba, E.E. (1997), "Reading the wind: how middle managers assess the contest for selling issues to top managers", *Strategic Management Journal*, Vol. 18 No. 5, pp. 407-425.

Edmondson, G., Baker, S. and Cortese, A. (1997), "Silicon Valley on the Rhine", *Business Week*, November, pp. 40-47.

Enns, H.G., Huff, S.L. and Higgins, C.A. (2003), "CIO lateral influence behaviors: gaining peers' commitment to strategic information systems", *MIS Quarterly*, Vol. 27 No. 1, pp. 155-176.

Fuenmayor, R.L. (1991), "The roots of reductionism: a counter-onto-epistemology for a systems approach", *Systems Practice*, Vol. 4 No. 5, pp. 419-448.

Galliers, R.D., Swatman, P.M.C. and Swatman, P.A. (1995), "Strategic information systems planning: deriving comparative advantages from EDI", *Journal of Information Technology*, Vol. 10 No. 3, pp. 149-158.

Garg, P. and Agarwal, D. (2014), "Critical success factors for ERP implementation in a Fortis hospital: an empirical investigation", *Journal of Enterprise Information Management*, Vol. 27 No. 4, pp. 402-423.

Giese, P.E. (1984), "Using information technology to capture 'strategic position'", *Management Review*, Vol. 73 No. 9, pp. 8-13.

Glowalla, P. and Sunyaev, A. (2014), "ERP system fit – an explorative task and data quality perspective", *Journal of Enterprise Information Management*, Vol. 27 No. 5, pp. 668-686.

Gottschalk, P. (1999a), "Implementation predictors of strategic information systems plans", *Information and Management*, Vol. 36 No. 2, pp. 77-91.

Goyal, S. and Grover, S. (2012), "A comprehensive bibliography on effectiveness measurement of manufacturing systems", *International Journal of Industrial Engineering Computations*, Vol. 3 No. 4, pp. 587-606.

Gulati, R., Nohria, N. and Zaheer, A. (2000), "Strategic networks", *Strategic Management Journal*, Vol. 21 No. 3, pp. 203-215.

Håkansson, H. and Snehota, I. (1989), "No business is an island: the network concept of business strategy", *Scandinavian Journal of Management*, Vol. 4 No. 3, pp. 187-200.

Hamilton, D. (1999), "Linking strategic information systems concepts to practice: systems integration at the portfolio level", *Journal of Information Technology*, Vol. 14 No. 1, pp. 69-82.

Hartono, E., Lederer, A.L., Sethi, V. and Zhuang, Y. (2003), "Key predictors of the implementation of strategic information systems plans", *The Data Base for Advances in Information Systems*, Vol. 34 No. 3, pp. 41-53.

Harzing, A.W.K. and Wal, R.V.D. (2008), "Google scholar as a new source for citation analysis", *Ethics in Science and Environmental Politics*, Vol. 8 No. 1, pp. 1-13.

Henderson, J.C., Venkatraman, N. and Alfred, P. (1993), "Strategic alignment: leveraging information technology for transforming organizations", *IBM Systems Journal Archive*, Vol. 32 No. 1, pp. 4-16.

Higgins, J.M. (2005), "The eight S of successful strategy execution", *Journal of Change Management*, Vol. 5 No. 1, pp. 3-13.

Hirschheim, R. and Sabherwal, R. (2001), "Detours in the path toward strategic information systems alignment", *California Management Review*, Vol. 44 No. 1, pp. 87-108.

Ho, J.L.Y., Wu, A. and Wu, S.Y.C. (2014), "Performance measures, consensus on strategy implementation, and performance: evidence from the operational-level of organizations", *Accounting, Organizations and Society*, Vol. 39 No. 1, pp. 38-58.

Holland, C.P. and Light, B. (1999), "Global enterprise resource planning implementation", *32nd Hawaii International Conference on System Sciences, Hawaii, January 5-8*.

Hrebiniak, L.G. (2006), "Obstacles to effective strategy implementation", *Organizational Dynamics*, Vol. 35 No. 1, pp. 12-31.

Hrebiniak, L.G. (2008), "Making strategy work: overcoming the obstacles to effective execution", *Ivey Business Journal*, Vol. 72 No. 2, p. 1.

Ittner, C.D. and Larcker, D.F. (1998), "Are non-financial measures leading indicators of financial performance? an analysis of customer satisfaction", *Journal of Accounting Research*, Vol. 36, pp. 1-35.

Jarillo, J.C. (1988), "On strategic networks", *Strategic Management Journal*, Vol. 9 No. 1, pp. 31-41.

Johnson, R.A. and Wichern, D.W. (1998), *Applied Multivariate Statistical Analysis*, Prentice-Hall, Englewood Cliffs, NJ.

Kanungo, S. and Bhatnagar, V.V. (2002), "Beyond generic models for information system quality: the use of interpretive structural modeling (ISM)", *Systems Research and Behavioral Science*, Vol. 19 No. 6, pp. 531-549.

Kaplan, R.S. and Norton, D.P. (1996), "Using the balanced scorecard as a strategic management system", *Harvard Business Review*, Vol. 74 No. 1, pp. 75-85.

Kaplan, R.S. and Norton, D.P. (2006), "How to Implement New Strategy without disrupting your organization", *Harvard Business Review*, March, January, pp. 100-109.

King, W.R. and Teo, T.S.H. (1996), "Key dimensions of facilitators and inhibitors for the strategic use of information technology", *Journal of Management Information Systems*, Vol. 12 No. 4, pp. 35-53.

Lederer, A.L. and Sethi, V. (1988), "The implementation of strategic information systems methodologies", *MIS Quarterly*, Vol. 12 No. 3, pp. 344-360.

Lee, G.G. and Pai, J.C. (2003), "Effects of organizational context and inter-group behavior on the success of strategic information systems planning: an empirical study", *Behavior and Information Technology*, Vol. 22 No. 4, pp. 263-280.

Leeflang, P., Wittink, D., Wedel, M. and Naert, P. (2000), *Building Models for Marketing Decisions*, Kluwer Academic Publishers, Boston, MA.

Lezcano, L., Barriocanal, E.G. and Sicilia, M.A. (2012), "Contrasting knowledge organization systems for the description of research products: the case of overlapping in the agricultural domain", *Procedia Computer Science*, Vol. 9, pp. 1571-1577.

Li, Y., Guohui, S. and Eppler, M.J. (2008), "Making strategy work: a literature review on the factors influencing strategy implementation", ICA Working Paper No. 2/2008, Institute for Corporate Communication, University of Lugano, Lugano, pp. 1-46.

Liang, C. (1999), "Critical success factors for reinventing the academic library", *Reference Service Review*, Vol. 27 No. 2, pp. 127-133.

Luftman, J.N. and Ben-Zvi, T. (2010), "Key issues for IT executives 2009: difficult economy's impact on IT", *MIS Quarterly Executive*, Vol. 9 No. 1, pp. 49-59.

McAdam, R. and O'Neill, E. (1999), "Taking a critical perspective to the European business excellence model using a balanced scorecard approach: a case study in the service sector", *Managing Service Quality*, Vol. 9 No. 3, pp. 191-197.

Mackay, J.M. and Elam, J.J. (1992), "A comparative study of how experts and novices use a decision aid to solve problems in complex knowledge domains", *Information Systems Research*, Vol. 3 No. 2, pp. 150-172.

Marginson, D.W. (2002), "Management control systems and their effects on strategy formation at middle-management levels: evidence from a UK organization", *Strategic Management Journal*, Vol. 23 No. 11, pp. 1019-1031.

Mathrani, S., Mathrani, A. and Viehland, D. (2013), "Using enterprise systems to realize digital business strategies", *Journal of Enterprise Information Management*, Vol. 26 No. 4, pp. 363-386.

Mintzberg, H. (1987), "Crafting strategy", *Harvard Business Review*, Vol. 65 No. 4, pp. 66-75.

Nasim, S. (2011), "Total interpretive structural modeling of continuity and change forces in e-government", *Journal of Enterprise Transformation*, Vol. 1 No. 2, pp. 147-168.

Neely, A. (2005), "The evaluation of performance measurement research: developments in the last decade and a research agenda for the next", *International Journal of Operations & Production Management*, Vol. 25 No. 12, pp. 1264-1277.

Neely, A., Mills, J., Platts, K., Gregory, M. and Richards, H. (1994), "Realizing strategy through measurement", *International Journal of Operations & Production Management*, Vol. 14 No. 3, pp. 140-152.

Nilsson, F. and Rapp, B. (1999), "Implementing business unit strategies: the role of management control systems", *Scandinavian Journal of Management*, Vol. 15 No. 1, pp. 65-88.

Noble, C.H., (1999), "The eclectic roots of strategy implementation research", *Journal of Business Research*, Vol. 45 No. 2, pp. 119-134.

Norreklit, H. (2000), "The balance on the balanced scorecard: a critical analysis of some of its assumptions", *Management Accounting Research*, Vol. 11 No. 1, pp. 65-88.

Norman, D.A. (1981), "Categorization of action slips", *Psychological Review*, Vol. 88 No. 1, pp. 1-15

Norman, D.A. and Shallice, T. (1985), "Attention to action: willed and automatic control of behavior", in Davidson, R.J., Schwartz, G.E. and Shapiro, D. (Eds), *Consciousness and Self-Regulation: Advances in Research*, Vol. 4, Plenum, New York, NY, pp. 1-18.

Norreklit, H. (2000), "The balance on the balanced scorecard: a critical analysis of some of its assumptions", *Management Accounting Research*, Vol. 11 No. 1, pp. 65-88.

Ogulin, R., Selen, W. and Ashayeri, J. (2012), "Determinants of informal coordination in networked supply chains", *Journal of Enterprise Information Management*, Vol. 25 No. 4, pp. 328-348.

Olson, E.M. and Slater, S.F. (2002), "The balanced scorecard, competitive strategy, and performance", *Business Horizon*, Vol. 45 No. 3, pp. 11-16.

Orlikowski, J.W. (2000), "Using technology and constituting structures: a practice lens for studying technology in organizations", *Organization Science*, Vol. 11 No. 4, pp. 404-428.

Otley, D. (1978), "Budget use and managerial performance", *Journal of Accounting Research*, Spring, pp. 122-149.

Pascale, R.T., Milleman, M. and Gioja, L. (1999), "Surfing the edge of chaos", *Sloan Management Review*, Vol. 40 No. 3, pp. 83-94.

Porter, M.E. (1980), *Competitive Strategy*, Free Press, New York, NY.

Prahalad, C.K. and Hamel, G. (1990), "The core competence of the corporation", *Harvard Business Review*, Vol. 68 No. 3, pp. 79-91.

Rackoff, N., Wiseman, C. and Ulrich, W.A. (1985), "Information systems for competitive advantage: implementation of a planning process", *MIS Quarterly*, Vol. 9 No. 4, pp. 285-294.

Reich, B.H. and Benbasat, I. (2000), "Factors that influence the social dimension of alignment between business and information technology objectives", *MIS Quarterly*, Vol. 24 No. 1, pp. 81-113.

Rho, B.H., Park, K. and Yu, Y.M. (2001), "An international comparison of the effect of manufacturing strategy-implementation gap on business performance", *Int. J. Production Economics*, Vol. 70 No. 1, pp. 89-97.

Roberts.H.J. and Barrar.P.R.N. (1992), "MRPII implementation: key factors for success", *Computer Integrated Manufacturing Systems*, Vol. 5 No. 1, pp. 31-38.

Sabherwal, R. and Chan, Y.E. (2001), "Alignment between business and IS strategies: a study of prospectors, analyzers, and defenders", *Information Systems Research*, Vol. 12 No. 1, pp. 11-33.

Segars, A.H., Grover, V. and Teng, J.T.C. (1998), "Strategic information systems planning: planning system dimensions, internal co-alignment, and implications for planning effectiveness", *Decision Sciences*, Vol. 29 No. 2, pp. 303-345.

Sengupta, K. and Te'eni, D. (1993), "Cognitive feedback in GDSS: improving control and convergence", *MIS Quarterly*, Vol. 17 No. 1, pp. 87-113.

Shah, S.K. and Corley, K.G. (2006), "Building better theory by bridging the quantitative-qualitative divide", *Journal of Management Studies*, Vol. 43 No. 8, pp. 1821-1835.

Sharma, R. and Yetton, P. (2003), "The contingent effects of management support and task interdependence on successful information systems implementation", *MIS Quarterly*, Vol. 27 No. 4, pp. 533-555.

Sharma, H.D., Gupta, A.D. and Sushil (1995), "The objectives of waste management in India: a futures inquiry", *Technological Forecasting and Social Change*, Vol. 48 No. 3, pp. 285-309.

Shatat, A.S. and Udin, Z.M. (2012), "The relationship between ERP system and supply chain management performance in Malaysian manufacturing companies", *Journal of Enterprise Information Management*, Vol. 25 No. 6, pp. 576-604.

Silver, M.S. (1991), "Decisional guidance for computer-based decision support", *MIS Quarterly*, Vol. 15 No. 1, pp. 105-122.

Simons, R. (1994), "How new top managers use control systems as levers of strategic renewal", *Strategic Management Journal*, Vol. 15 No. 3, pp. 169-189.

Simons, R. (1999), *Performance Measurement and Control Systems for Implementing Strategy*, Prentice-Hall, Englewood Cliffs, NJ.

Singh, A.N., Gupta, M.P. and Ojha, A. (2014), "Identifying factors of 'organizational information security management' ", *Journal of Enterprise Information Management*, Vol. 27 No. 5, pp. 644-667.

Singh, D.T. (1998), "Incorporating cognitive aids into decision support systems: the case of the strategy execution process", *Decision Support Systems*, Vol. 24 No. 2, pp. 145-163.

Singh, D.T. and Ginzberg, M.J. (1996), "An empirical investigation of the impact of process monitoring on computer-mediated decision-making performance", *Organizational Behavior and Human Decision Processes*, Vol. 67 No. 2, pp. 156-169

Spencer, X., Sarah, Y., Joiner, T.A. and Salmon, S. (2009), "Differentiation strategy, performance measurement systems and firm performance: evidence from Australia", *International Journal of Business*, Vol. 14 No. 1, pp. 1-22.

Srivastava, A.K. and Sushil (2013), "Modeling 'strategic performance factors' for effective strategy execution", *International Journal of Productivity and Performance Management*, Vol. 62 No. 6, pp. 554-582.

Stalk, G. (1988), "Time – the next source of competitive advantage", *Harvard Business Review*, Vol. 66, pp. 41-51.

Sushil (2005), "Interpretive matrix: a tool to aid interpretation of management and social research", *Global Journal of Flexible Systems Management*, Vol. 6 No. 2, pp. 27-30.

Sushil (2008), "How balanced is balanced scorecard", *Global Journal of Flexible Systems Management*, Vol. 9 Nos 2-3, pp. 3-5.

Sushil (2009), "Interpreting the interpretive structural model", working paper series, Department of Management Studies, Indian Institute of Technology, Delhi, New Delhi.

Sushil (2012), "Interpreting the interpretive structural model", *Global Journal of Flexible Systems Management*, Vol. 13 No. 2, pp. 87-106.

Tallon, P.P. and Pinsonneault, A. (2011), "Competing perspectives on the link between strategic information technology alignment and organizational agility: insights from a mediation model", *MIS Quarterly*, Vol. 35 No. 2, pp. 463-486.

Tatikonda, L.U. and Tatikonda, R.J. (1998), "We need dynamic performance measures", *Management Accounting*, Vol. 80 No. 3, pp. 49-53.

Teo, T.S.H. and Ang, J.S.K. (1999), "Critical success factors in the alignment of IS plans with business plans", *International Journal of Information Management*, Vol. 19 No. 2, pp. 173-185.

Thakkar, J., Deshmukh, S.G., Gupta, A.D. and Shankar, R. (2007), "Development of a balanced scorecard: an integrated approach of interpretive structural modeling (ISM) and analytic network process (ANP)", *International Journal of Productivity and Performance Management*, Vol. 56 No. 1, pp. 25-59.

Todd, P. and Benbasat, I. (1987), "Process tracing methods in decision support systems research: exploring the black box", *MIS Quarterly*, Vol. 11 No. 4, pp. 493-512.

Tseng, S.M. and Lee, P.S. (2014), "The effect of knowledge management capability and dynamic capability on organizational performance", *Journal of Enterprise Information Management*, Vol. 27 No. 2, pp. 158-179.

Venkatraman, N. (1994), "IT-enabled business transformation: from automation to business scope redefinition", *Sloan Management Review*, Vol. 35 No. 2, pp. 73-87.

Wade, M. and Hulland, J.S. (2004), "Review: the resource-based view and information systems research: review, extension, and suggestions for future research", *MIS Quarterly*, Vol. 28 No. 1, pp. 107-142.

Walsham, G. and Waemaa, T. (1994), "Information systems strategy and implementation: a case study of a building society", *Transactions on Information Systems*, Vol. 12 No. 2, pp. 150-173.

Warfield, J.N. (1974), "Structuring complex systems", Battelle Monograph 4, Battelle Memorial Inst, Columbus, OH.

Zheng, W., Yang, B. and McLean, G.N. (2010), "Linking organizational culture, structure, strategy, and organizational effectiveness: mediating role of knowledge management", *Journal of Business Research*, Vol. 63 No. 7, pp. 763-771.

Zheng, S., Zhang, W., Wu, X. and Du, J. (2011), "Knowledge-based dynamic capabilities and innovation in networked environments", *Journal of Knowledge Management*, Vol. 15 No. 6, pp. 1035-1051.

Further reading

Andrews, K.R. (1971), *The Concept of Corporate Strategy*, Dow Jones-Irwin, New York, NY.

Bharadwaj, A. (2000), "A resource-based perspective on information technology capability and firm performance: an empirical investigation", *MIS Quarterly*, Vol. 24 No. 1, pp. 169-196.

Bhide, A. (1986), "Hustle as strategy", *Harvard Business Review*, Vol. 64 No. 5, pp. 59-65.

Cater, T. and Pucko, D. (2010), "Factors of effective strategy implementation: empirical evidence from Slovenian business practice", *JEEMS*, Vol. 3 No. 3, pp. 207-236.

Charalambos, L.I. (1999), "The IPACS project: when IT hits the fan", *Journal of Information Technology*, Vol. 14 No. 3, pp. 267-276.

Child, J. (1972), "Organizational structures, environment and performance: the role of strategic choice", *Sociology*, Vol. 6 No. 1, pp. 2-22.

Cohen, K.J. and Cyert, R.M. (1973), "Strategy: formulation, implementation, and monitoring", *The Journal of Business*, Vol. 46 No. 3, pp. 349-367.

Eardly, A., Avison, D. and Powell, P. (1997), "Developing information systems to support flexible strategy", *Journal of Organizational Computing and Electronic Commerce*, Vol. 7 No. 1, pp. 57-77.

Gallagher, K.P. and Gallagher, V.C. (2012), "Organizing for post-implementation ERP", *Journal of Enterprise Information Management*, Vol. 25 No. 2, pp. 170-185.

Gordon, R.A. and Howell, J.E. (1959), *Higher Education for Business*, Columbia University Press, New York, NY.

Grinyer, P.H., Ardekani, M.Y. and Al-Bazzaz, S. (1980), "Strategy, structure, the environment, and financial performance in 48 United Kingdom companies", *Academy of Management Journal*, Vol. 23 No. 2, pp. 193-220.

Grundy, T. (1998), "Strategy implementation and project management", *International Journal of Project Management*, Vol. 16 No. 1, pp. 43-50.

Gupta, S. (2008), "Breaking infrastructure constraints by accelerating project execution", *World Oil*, Vol. 229 No. 11, pp. 1-4.

Hamdi, N. and Goethert, R. (1985), "Implementation: theories, strategies and practice", *Habitat Intl*, Vol. 9 No. 1, pp. 33-44.

Heeks, R. (2002), "Information systems and developing countries: failure, success, and local improvisations", *The Information Society*, Vol. 18 No. 2, pp. 101-112.

Kiechel, W. (1984), "Sniping at strategic planning", *Planning Review*, May, pp. 8-11.

Martin, R.L. (2010), "The execution trap", *Harvard Business Review*, July-August, pp. 64-71.

Miller, D. (1986), "Configurations of strategy and structure: towards a synthesis", *Strategic Management Journal*, Vol. 7 No. 3, pp. 233-249.

Mintzberg, H. (1978), "Patterns in strategy formation", *Management Science*, Vol. 24 No. 9, pp. 934-948.

Piccolli, G., Bass, B. and Ives, B. (2003), "Custom-made apparel at land's end", *MIS Quarterly Executive*, Vol. 2 No. 2, pp. 74-84.

Porter, M.E. and Millar, V.E. (1985), "How information gives competitive advantage", *Harvard Business Review*, Vol. 63 No. 4, pp. 149-160.

Premkumar, G. and Ramamurthy, K. (1995), "The role of inter-organizational and organizational factors on the decision mode for adoption of inter-organizational systems", *Decision Sciences*, Vol. 26 No. 3, pp. 303-336.

Sambamurthy, V., Bharadwaj, A. and Grover, V. (2003), "Shaping agility through digital options: re-conceptualizing the role of information technology in contemporary firms", *MIS Quarterly*, Vol. 27 No. 2, pp. 237-263.

Silva, L. and Hirschheim, R. (2007), "Fighting against windmills: strategic information systems and organizational deep structures", *MIS Quarterly*, Vol. 31 No. 2, pp. 327-354.

Taylor, B. (1973), "Introducing strategic management", *Long Range Planning*, Vol. 6 No. 3, pp. 34-38.

Wagner, C. (2004), "Enterprise strategy management systems: current and next generation", *Journal of Strategic Information Systems*, Vol. 13 No. 2, pp. 105-128.

Wiseman, C. (1985), *Strategy and Computers: Information Systems as Competitive Weapons*, Irwin, Homewood, IL.

Appendix 1

SN	Paired comparison of variables of Automate	Yes/no	In what Way a variable will influence/enhance other variable? Give reason in brief
1	Organization Support Systems – Information System		
2	Organization Support Systems – Analytics and Knowledge Base		
3	Organization Support Systems – Plan and Performance Management System		
4	Organization Support Systems – Control and Monitoring System		
5	Information System – Organization Support Systems		
6	Information System – Analytics and Knowledge Base		
7	Information System – Plan and Performance Management System		
8	Information System – Control and Monitoring System		
9	Plan and Performance Management System – Organization Support Systems		
10	Plan and Performance Management System – Analytics and Knowledge Base		
11	Plan and Performance Management System – Information Systems		
12	Plan and Performance Management System – Control and Monitoring System		

Note: [a]Considering the large size of the questionnaire, only a part of it is given here

Table AI. TISM questionnaire[a]

Appendix 2. Survey questionnaire for *t*-test

Part One: Personal profile of the respondent

Name (optional) : ______________________________

Company (Optional) : ______________________________

Department/division : ______________________________

Are you in a leadership role : Yes / No

Age : _____Years

Gender : Male / Female

Qualification : ______________________________

Total work experience (number of years) : ________

Experience in current company (number of years) : ________

What is your role in the organizational policy? Planning / Coordination / Execution

What is your designation in the organization? : ________

Part Two: Rating the statements on a scale of 5

S.N.	Statements	Response
1	Organization support system affects design and development of information system	Strongly disagree (1) to strongly agree (5)
2	Organization support system affects design and development of analytics and knowledge base	
3	Organization support system affects design and development of plan and performance management	
4	Organization support system affects design and development of control and monitoring system	
5	Information systems affects design and development of analytics ad knowledge base	
6	Information systems affects design and development of plan and performance management	
7	Information systems affects design and development of control and monitoring	
8	Analytics and knowledge base affects design and development of plan and performance management	
9	Analytics and knowledge base affects design and development of control and monitoring system	
10	Plan and performance management affects design and development of analytics and knowledge base	
11	Plan and performance management affects design and development of control and monitoring system	

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