Assessing the impact of integrating business planning and IS planning

Thompson S.H. Teo\textsuperscript{a,*}, William R. King\textsuperscript{b}

\textsuperscript{a}Department of Decision Sciences, Faculty of Business Administration, National University of Singapore, 10 Kent Ridge Crescent, Singapore 0511, Singapore

\textsuperscript{b}Katz Graduate School of Business, University of Pittsburgh, Pittsburgh, PA 15260, USA

Abstract

One of the key elements of strategic planning for information systems (IS) is the integration of IS planning (ISP) and business planning (BP). Although this issue has received significant attention in recent years, empirical research focusing specifically on it is still relatively sparse. Here, BP-ISP integration is considered in four ways (administrative, sequential, reciprocal, and full integration), reflecting various degrees of BP-ISP integration. The relationships between these and organizational impact (measured in terms of the extent of ISP problems and the extent of IS contributions to organizational performance) are investigated through the analysis of data gathered in a "matched pair" field survey of business planners and IS executives. The results empirically validate the importance of BP-ISP integration, since it was found to have a significant positive relationship with IS contributions to organization performance and a significant negative relationship to the extent of ISP problems.

Keywords: Alignment; Business planning; Information systems planning; Integration; IS planning problems; Performance impact

1. Introduction

Strategic planning for information systems (IS) has been consistently ranked among the top issues facing information system executives [30]. Generally, IS researchers believe that for strategic IS planning to be effective, it must involve the integration between IS planning (ISP) and business planning (BP), which will here be referred to as "BP-ISP integration".

BP-ISP integration can be defined as the alignment of IS strategies with business goals and business strategies gained through coordination between the business and IS planning functions and activities. If ISP activities are not coordinated with BP activities, it is likely to be very difficult for IS to support business strategies and to contribute to the achievement of business value. In addition, it is only through such efforts that technical issues can be effectively integrated with business issues [1].

Although the concept of BP-ISP integration has received significant attention in recent years, it is primarily conceptual in nature. Empirical research focusing on BP-ISP integration is relatively sparse; most has focused on identifying ISP issues (e.g., problems, benefits, and management), rather than on assessing the level and impact of BP-ISP integration.
1.1. BP–ISP integration

King [16] was among the first IS researchers to recognize and emphasize the importance of BP–ISP integration. He emphasized that the MIS strategy set (system objectives, system constraints, and system design strategies) should be directly derived from the organizational strategy set (business mission, objectives, strategy and other strategic organizational attributes).

This conceptualization of one-way sequential integration (from BP to ISP) has been refined by King and Zmud [20] to a two-way reciprocal integration between BP and ISP. This change was brought about by the realization that ISP can be used not only to support, but also to influence, business strategies. This concept of two-way reciprocal integration has formed the basis for subsequent work in this area.

1.1.1. BP–ISP Taxonomies

Synnott [37] conceptualized ISP in terms of the extent of BP–ISP integration as:

1. No planning: No formal BP or ISP.
2. Stand-alone planning: Presence of either business plan or IS plan, but not both.
3. Reactive planning: IS function reacts to business plans and has no input in the BP process.
4. Linked planning: BP is “interfaced” with ISP. System resources are matched against business needs.
5. Integrated planning: BP is indistinguishable from ISP. They occur simultaneously and interactively.

A noteworthy feature of this taxonomy is that in the first and second forms of planning, BP–ISP integration is virtually absent. Other features of Synnott’s conceptualization bear some similarities to earlier conceptualizations of BP–ISP integration by other researchers.

In another taxonomy of the levels of BP–ISP integration, Jang [14] proposed that there are four forms of ISP based on the extent of BP–ISP integration:

1. Pre-planning, when there is no link between BP and ISP.
2. Separate planning, when there is a weak integration between BP and ISP. ISP is therefore primarily non-strategic (similar to stand alone planning).
3. Linked planning, when ISP is guided by BP and has no opportunity to influence BP (similar to one-way sequential integration).
4. Integrated planning, when there is a two-way reciprocal relationship between BP and ISP, i.e., ISP is not only guided by BP, but it can also influence business strategies.

Yet another conceptualization of integrated planning was offered by Goldsmith [7] who illustrated how BP–ISP integration was carried out at Simon Engineering (England). Both the value chain and competitive forces framework [27] were incorporated into the Information Engineering methodology [26] for ISP. Goldsmith emphasized that rather than separating ISP from BP (and aligning them through linkages), ISP should be integrated within BP. He further argued that in order for competitive advantage to be secured from IT applications, information strategies need to be developed in the same process and at the same time as business strategies.

1.2. The Impacts of BP–ISP Integration

The benefits of increasing the extent of BP–ISP integration has been emphasized in both prescriptive [36] and empirical studies [34, 39]. These studies suggest that a greater extent of BP–ISP integration helps to ensure that the IS function supports organizational goals and activities at every level by identifying critical applications for development and ensuring that adequate resources are allocated to critical applications. BP–ISP integration also helps to ensure that the IS function becomes an integral part of the organization, and is not merely appended to it, by facilitating information sharing, and feedback between top management, and IS management during strategy formulation and implementation [2].

Although many researchers have emphasized the importance of BP–ISP integration, very few attempt to link BP–ISP integration to performance measures. Instead, researchers commonly focus on conceptual and organizational issues, e.g., Powell [33] examines the extent to which the relationship between IT and
business strategy has changed over time. Lederer and Mendelow [21] conducted interviews to examine why coordination between IS plans and business plans are often plagued with difficulties. Similarly, Nath [28] identified organizational factors perceived to be important in aligning IS with business goals.

In terms of the empirical evaluation of the impact of BP–ISP integration, Das et al. [5] cited an A.T. Kearney study which shows that organizations that integrated business plans and IS plans generally outperform those who do not. Chan and Huff [3] found that IS strategic alignment was consistently related to various dimensions of IS effectiveness. However, mixed results with respect to IS strategic alignment and various dimensions of IS performance were obtained.

2. Operationalizing the measures

In this study, the independent variable of interest is the “extent of BP–ISP integration”. The dependent variable is the “impact of BP–ISP integration” which is operationalized in terms of the extent of ISP problems and the “extent of IS contributions to organizational performance”.

2.1. Extent of BP–ISP Integration

The taxonomies of BP–ISP integration serve as a basis for operationalizing the extent of BP–ISP integration. We have chosen to use a four-stage approach. It omits the “no integration level” of some of the previous taxonomies because that level is neither as prevalent nor significant as it once was and because it is unlikely that it can be distinguished from a weak form of administrative integration—e.g., that in which overall IS budgets depend on the outcomes of business planning. This difficulty in distinguishing between “no integration” and “administrative integration” became apparent during pretesting of the measurement instrument. Hence, we decided that a four-stage taxonomy would be sufficiently parsimonious without omitting any significant form of BP–ISP integration.

The four-stage taxonomy [19, 38] is:

Type 1: Separate planning with administrative integration;

Type 2: One-way linked planning with sequential integration;

Type 3: Two-way linked planning with reciprocal integration; and

Type 4: Integrated planning with full integration.

Each successive type reflects an increased strategic potential for IT and enables more effective alignment between IS and business strategies. The role of the IS function for Types 1 and 2 are essentially reactive in nature, since the IS function has negligible influence on business strategies. Conversely, the role of the IS function for Types 3 and 4 are more proactive in nature, since the IS function plays a role in both supporting and influencing business strategies.

2.2. Impact of BP–ISP Integration

Two varieties of organizational impacts can be usefully considered—intermediate and overall. Intermediate impacts pertain to ISP itself, while overall impacts pertain to the organization as a whole. Intermediate impacts have been treated in terms of “ISP problems” [23]. Overall impacts relate to the impact of IS on organizational performance.

2.2.1. ISP Problems

More extensive and sophisticated BP–ISP integration should affect the business relevance and quality of ISP. Problems associated with ISP can undermine the quality of ISP, thereby resulting in wasted resources and lost opportunities [17]. It appears that such ISP problems can be mitigated by greater BP–ISP integration.

ISP problems have been widely discussed in the IS literature and have been classified in terms of input, process and output problems [22], organizational, commitment/contractual, outcome/expectations, expertise/technical and implementation problems [13], leadership, implementation and resource problems [24], organization, implementation, database, hardware, and cost problems [25]. Since, the last categorization of ISP problems is the most comprehensive and has been rigorously derived by Lederer and Sethi, it will form the basis for our measurement of ISP problems.

The extent of ISP problems can be readily operationalized in terms of:
1. Organization problems
2. Implementation problems
3. Database problems
4. Hardware problems
5. Cost problems.

Organization problems concern the failure of ISP to sufficiently consider organizational strategies and characteristics, the needs of users, IS objectives and the IS applications portfolio. Implementation problems concern the difficulty of carrying out the plan due to poor communication with top management and poor ISP output documents. Database problems concern the failure to set priorities for databases, and plan for an overall data administration and data architecture for the organization. Hardware problems concern the failure to plan for overall hardware and data communications for the organization. Cost problems deal with the excessive duration and associated costs of ISP.

2.2.2. IS Contributions to Organizational Performance

Since BP–ISP integration facilitates a common frame of reference that is essential for the internal consistency and the external validity of plans [12], it can lead to the more effective deployment of IT to serve business needs and to better exploitation of opportunities to use IT for the creation of business value. The contribution of IS to organizational performance is perhaps the oldest and most commonly used form of assessing the impact of planning systems. However, the link between ISP and organizational performance is elusive [4, 6] and often controversial [9, 10]. Similar difficulties have been found in the strategy literature which reported mixed findings regarding the effects of BP on organizational performance (e.g., [32]). The basis for this conclusion is that any planning system should ultimately have an impact on the firm’s financial performance (e.g., improvement in ROI) and/or nonfinancial performance (e.g., increased customer satisfaction).

IS contributions to organizational performance can also be assessed in terms of increased market share, improved internal efficiency of the firm’s operations, increased annual sales revenue, etc.

3. Research Propositions and Hypotheses

The literature suggests that greater BP-ISP integration will influence the organization in terms of ISP problems and IS contributions to organizational performance.

3.1. Impact of BP-ISP Integration

3.1.1. ISP Problems

ISP problems tend to be less severe when planning is strategic rather than financial or tactical. Greater BP–ISP integration is most likely to be associated with planning that is strategic rather than financial or tactical; this aids communication between IS and top management and cultivates better understanding and a more realistic expectation of the role of the IS function.

The first proposition to be addressed is that there is an inverse relationship between the extent of BP–ISP integration and the extent of various kinds of ISP problems in an organization. The first hypothesis is therefore:

Hypothesis 1: The greater the extent of BP-ISP integration, the lesser the extent of:
1. Organization problems.
2. Implementation problems.
3. Database problems.
4. Hardware problems.
5. Cost problems.

3.1.2. IS Contributions to Organizational Performance

In order for the IS function to contribute to overall organizational performance, it is necessary to establish integration between BP and ISP. When the integration between BP and ISP is weak, the role of IS is likely to be supportive rather than salient in the creation of business value.

The second proposition is that there is a positive relationship between the extent of BP–ISP integration and the level of overall organizational performance. The second hypothesis is therefore:

Hypothesis 2: The greater the extent of BP–ISP integration, the greater will be the extent of IS contributions to organizational performance.
4. Research Methodology

4.1. The sample

A random sample of 600 firms was obtained from the Corporate 1000 book: this source generally lists medium to large US corporations, and consequently are likely to use and have experience with IT. This is important, as we wanted the sample to include firms practicing all four types of integration.

The development of the instrument involved a series of pretests using doctoral and MBA students, IS practitioners, and graduate business school faculty members over a period of about three months. The pretests resulted in changes in the wordings of certain items and the rearrangement of the order of some of the items to improve clarity and minimize ambiguity. In particular, some of the items pertaining to ISP problems were reverse coded to minimize bias due to the negative connotation of the construct.

Questionnaires were prepared and sent directly to the CEO with instructions requesting him/her to forward the questionnaires to the Senior Business Planner and the Senior Information Systems Executive. The directions for distribution directed that if ISP is carried out centrally at the corporate level for most business segments (i.e., divisions or business units), the questionnaires should be forwarded to the Senior Business Planner and the Senior Information Systems Executive responsible for BP and ISP at the corporate level respectively. Conversely, if ISP is carried out independently in each business segment (i.e., division or business unit), the CEO was asked to select a core business segment, and forward the questionnaires to the Senior Business Planner and the Senior Information Systems Executive responsible for that core business segment. As a validation check, both respondents were asked to state and briefly describe the business segment for which they were responsible.

4.2. The instrument

The four types of BP–ISP integration (administrative integration, sequential integration, reciprocal integration, and full integration) were described and respondents were asked to indicate the type that best described their firm’s current BP–ISP integration (see survey instrument in the Appendix).

Since the IS executives are involved in ISP, they were asked questions relating to the current type of BP–ISP integration and also the extent of ISP problems in their organizations. The Business Planners were asked to evaluate the extent of IS contributions to organizational performance. Note that since the current type of integration and IS contributions to organizational performance are measured using different respondents, the problem of common source variance is reduced.

4.3. Response and non-response analysis

A primary mailing and two follow-up mailings were made; the first and second follow-ups were made about three and seven weeks from the date of initial mailings. Forty-five firms declined participation citing one or more of the following reasons: company policy not to respond to any questionnaire, lack of manpower, company currently undergoing restructuring. Useable “matched pairs” were returned by 157 firms (26.2%). This response rate is adequate but somewhat lower than that usually achieved. This may be explained by the high level of the respondents and the fact that two responses per firm were required. Previous research using the matched-pair design usually involved an IS Executive and a user who might or might not be senior executives (e.g., [35]).

A summary of the characteristics of respondents is shown in Table 1. They come from a wide range of industries with a predominance of manufacturing firms. The annual sales revenue is widely distributed, in the anticipated medium to high range. The number of employees in each firm varies. Both the job titles of Business Planners and IS Executives confirm that respondents are almost exclusively Senior Executives in the firm since more than 70% of respondents are at the Director level or higher.

Comparisons (using chi-square tests at \( p = 0.05 \)) between respondents and non respondents were made in terms of industry representation, annual sales revenue, and the number of employees. The results suggested the absence of non-response bias.
Table 1
Characteristics of respondents a

<table>
<thead>
<tr>
<th>Characteristics of respondents a</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Industry</td>
<td></td>
</tr>
<tr>
<td>Oil/Petroleum</td>
<td>3.8</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>31.2</td>
</tr>
<tr>
<td>Medicine/Health</td>
<td>5.1</td>
</tr>
<tr>
<td>Utilities</td>
<td>14.6</td>
</tr>
<tr>
<td>Transportation</td>
<td>5.7</td>
</tr>
<tr>
<td>Wholesale/Retail</td>
<td>11.5</td>
</tr>
<tr>
<td>Restaurant/Hotel</td>
<td>1.9</td>
</tr>
<tr>
<td>Finance/Insurance/Real Estate</td>
<td>2.5</td>
</tr>
<tr>
<td>Publishing/Information/News</td>
<td>5.1</td>
</tr>
<tr>
<td>Computers/Communications</td>
<td>8.9</td>
</tr>
<tr>
<td>Others</td>
<td>9.6</td>
</tr>
<tr>
<td>2. Annual Sales ($ Million)</td>
<td></td>
</tr>
<tr>
<td>Below 300</td>
<td>8.9</td>
</tr>
<tr>
<td>300 — Less than 600</td>
<td>12.7</td>
</tr>
<tr>
<td>600 — Less than 1000</td>
<td>10.8</td>
</tr>
<tr>
<td>1000 — Less than 2000</td>
<td>19.7</td>
</tr>
<tr>
<td>2000 — Less than 3000</td>
<td>10.8</td>
</tr>
<tr>
<td>3000 — Less than 5000</td>
<td>15.2</td>
</tr>
<tr>
<td>Above 5000</td>
<td>21.7</td>
</tr>
<tr>
<td>3. Number of Employees</td>
<td></td>
</tr>
<tr>
<td>100 — Less than 300</td>
<td>0.6</td>
</tr>
<tr>
<td>300 — Less than 1000</td>
<td>6.4</td>
</tr>
<tr>
<td>1000 — Less than 2000</td>
<td>9.6</td>
</tr>
<tr>
<td>2000 — Less than 3000</td>
<td>18.5</td>
</tr>
<tr>
<td>3000 — Less than 5000</td>
<td>15.2</td>
</tr>
<tr>
<td>Above 10000</td>
<td>21.0</td>
</tr>
<tr>
<td>4. Respondent’s Hierarchical Level</td>
<td>Business Planner IS Executive</td>
</tr>
<tr>
<td>President/Sr. or Exec. VP</td>
<td>19.1</td>
</tr>
<tr>
<td>Vice President</td>
<td>35.7</td>
</tr>
<tr>
<td>Director</td>
<td>24.2</td>
</tr>
<tr>
<td>Manager</td>
<td>15.9</td>
</tr>
<tr>
<td>Asst. VP/Dir/Mgr</td>
<td>1.9</td>
</tr>
<tr>
<td>Others</td>
<td>0.6</td>
</tr>
<tr>
<td>Missing Data</td>
<td>2.5</td>
</tr>
</tbody>
</table>

a n = 157; all numbers indicate percentages

4.4. Assessing validity and reliability

Since a single item might not fully tap a construct or might be subject to misinterpretation by the respondents, multiple items were used for each construct. The reliability of the scales was assessed using Cronbach Alpha, which are an indication of the internal consistency of the items measuring the same construct. High values indicate high internal consistency of the multiple items measuring each construct, hence indicating high reliability of the individual constructs. Each item should add to the reliability of the construct. Based on this criteria, one item from organization problems and two items from implementation problems were dropped. In general, the reliability coefficients are equal to or above the recommended value of 0.60 for exploratory research [31] (see Table 2).

For statistical analyzes, the multiple items comprising a construct were summed together into a single score. This assumes that each item contributes equally, and this assumption has been used successfully in previous research examining ISP and the strategic use of IT (e.g., [29]).

Since the existing state of integration was measured by asking respondents to place a check-mark beside one of the four descriptions of the types of integration, it was important that respondents were able to understand and distinguish among the four types. As a validity check, telephone calls were made to respondents to determine whether they had any difficulty in understanding or distinguishing among the descriptions of the four types of integration. The results of these interviews showed that none of the respondents had any difficulty in understanding or distinguishing among them. In fact, one respondent commented that the four types of integration are “nice concepts” for understanding BP–ISP integration.

As another validity check, we also examined the relationships between the types of integration and commonly accepted measures of growth, namely

4.4. Assessing validity and reliability

Since a single item might not fully tap a construct or might be subject to misinterpretation by the respondents, multiple items were used for each construct. The reliability of the scales was assessed using Cronbach Alpha, which are an indication of the internal consistency of the items measuring the same construct. High values indicate high internal consistency of the multiple items measuring each construct, hence indicating high reliability of the individual constructs. Each item should add to the reliability of the construct. Based on this criteria, one item from organization problems and two items from implementation problems were dropped. In general, the reliability coefficients are equal to or above the recommended value of 0.60 for exploratory research [31] (see Table 2).

For statistical analyzes, the multiple items comprising a construct were summed together into a single score. This assumes that each item contributes equally, and this assumption has been used successfully in previous research examining ISP and the strategic use of IT (e.g., [29]).

Since the existing state of integration was measured by asking respondents to place a check-mark beside one of the four descriptions of the types of integration, it was important that respondents were able to understand and distinguish among the four types. As a validity check, telephone calls were made to respondents to determine whether they had any difficulty in understanding or distinguishing among the descriptions of the four types of integration. The results of these interviews showed that none of the respondents had any difficulty in understanding or distinguishing among them. In fact, one respondent commented that the four types of integration are “nice concepts” for understanding BP–ISP integration.

As another validity check, we also examined the relationships between the types of integration and commonly accepted measures of growth, namely

4.4. Assessing validity and reliability

Since a single item might not fully tap a construct or might be subject to misinterpretation by the respondents, multiple items were used for each construct. The reliability of the scales was assessed using Cronbach Alpha, which are an indication of the internal consistency of the items measuring the same construct. High values indicate high internal consistency of the multiple items measuring each construct, hence indicating high reliability of the individual constructs. Each item should add to the reliability of the construct. Based on this criteria, one item from organization problems and two items from implementation problems were dropped. In general, the reliability coefficients are equal to or above the recommended value of 0.60 for exploratory research [31] (see Table 2).

For statistical analyzes, the multiple items comprising a construct were summed together into a single score. This assumes that each item contributes equally, and this assumption has been used successfully in previous research examining ISP and the strategic use of IT (e.g., [29]).

Since the existing state of integration was measured by asking respondents to place a check-mark beside one of the four descriptions of the types of integration, it was important that respondents were able to understand and distinguish among the four types. As a validity check, telephone calls were made to respondents to determine whether they had any difficulty in understanding or distinguishing among the descriptions of the four types of integration. The results of these interviews showed that none of the respondents had any difficulty in understanding or distinguishing among them. In fact, one respondent commented that the four types of integration are “nice concepts” for understanding BP–ISP integration.

As another validity check, we also examined the relationships between the types of integration and commonly accepted measures of growth, namely

4.4. Assessing validity and reliability

Since a single item might not fully tap a construct or might be subject to misinterpretation by the respondents, multiple items were used for each construct. The reliability of the scales was assessed using Cronbach Alpha, which are an indication of the internal consistency of the items measuring the same construct. High values indicate high internal consistency of the multiple items measuring each construct, hence indicating high reliability of the individual constructs. Each item should add to the reliability of the construct. Based on this criteria, one item from organization problems and two items from implementation problems were dropped. In general, the reliability coefficients are equal to or above the recommended value of 0.60 for exploratory research [31] (see Table 2).

For statistical analyzes, the multiple items comprising a construct were summed together into a single score. This assumes that each item contributes equally, and this assumption has been used successfully in previous research examining ISP and the strategic use of IT (e.g., [29]).

Since the existing state of integration was measured by asking respondents to place a check-mark beside one of the four descriptions of the types of integration, it was important that respondents were able to understand and distinguish among the four types. As a validity check, telephone calls were made to respondents to determine whether they had any difficulty in understanding or distinguishing among the descriptions of the four types of integration. The results of these interviews showed that none of the respondents had any difficulty in understanding or distinguishing among them. In fact, one respondent commented that the four types of integration are “nice concepts” for understanding BP–ISP integration.

As another validity check, we also examined the relationships between the types of integration and commonly accepted measures of growth, namely
number of years of formal ISP. This method of validation has been commonly used in organizational research to assess the validity of the self-typing paragraph measure [15]. As expected, the results show an increasing trend in the number of years of formal ISP with greater extent of BP–ISP integration \((F = 2.85, p < 0.05)\). Hence, the self-typing paragraph measure of the extent of integration is deemed valid.

5. Analyses and results

The results show that sequential integration \((n = 65)\) and reciprocal integration \((n = 65)\) occur most often, followed by administrative integration \((n = 17)\) and full integration \((n = 10)\). This distribution of the types of integration is not surprising if we make the assumption that firms generally move in the direction toward greater levels of BP–ISP integration (i.e., generally from administrative toward full integration). However, very few firms have indicated that they have reached full integration.

5.1. Hypotheses testing

Table 3 shows the Pearson correlations between the extent of BP–ISP integration and performance measures. With the exception of cost problems, all the correlations were significant. Hence all hypotheses, with the exception of \(H1(e)\), were supported.

Table 3

<table>
<thead>
<tr>
<th>Performance Measures</th>
<th>ISP Problems</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(a) Organization Problems</td>
<td>-0.39*</td>
</tr>
<tr>
<td></td>
<td>(b) Implementation Problems</td>
<td>-0.36*</td>
</tr>
<tr>
<td></td>
<td>(c) Database Problems</td>
<td>-0.32*</td>
</tr>
<tr>
<td></td>
<td>(d) Hardware Problems</td>
<td>-0.29*</td>
</tr>
<tr>
<td></td>
<td>(e) Cost Problems</td>
<td>-0.06</td>
</tr>
<tr>
<td></td>
<td>IS Contributions to Organizational Performance</td>
<td>0.35*</td>
</tr>
</tbody>
</table>

*p < 0.001

Table 4

<table>
<thead>
<tr>
<th>Performance Measures</th>
<th>Administrative Integration</th>
<th>Sequential Integration</th>
<th>Reciprocal Integration</th>
<th>Full Integration</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Impact of BP–ISP Integration ISP Problems</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. ORG</td>
<td>3.54 (1.25)</td>
<td>2.75 (0.95)</td>
<td>2.27 (0.69)</td>
<td>2.28 (0.72)</td>
<td>10.76*</td>
</tr>
<tr>
<td>b. IMPLMN</td>
<td>4.22 (1.26)</td>
<td>3.73 (0.96)</td>
<td>3.22 (0.90)</td>
<td>2.83 (1.10)</td>
<td>7.55*</td>
</tr>
<tr>
<td>c. DBASE</td>
<td>4.29 (1.81)</td>
<td>3.28 (1.34)</td>
<td>2.95 (1.18)</td>
<td>2.30 (0.71)</td>
<td>6.43*</td>
</tr>
<tr>
<td>d. HWARE</td>
<td>3.71 (2.27)</td>
<td>2.72 (1.43)</td>
<td>2.35 (0.83)</td>
<td>2.05 (0.83)</td>
<td>5.57*</td>
</tr>
<tr>
<td>e. COST</td>
<td>3.76 (1.63)</td>
<td>3.85 (1.31)</td>
<td>3.59 (1.25)</td>
<td>3.75 (1.55)</td>
<td>0.42</td>
</tr>
<tr>
<td>PERFORM</td>
<td>4.09 (1.03)</td>
<td>4.08 (1.00)</td>
<td>4.87 (0.97)</td>
<td>5.14 (1.23)</td>
<td>9.00*</td>
</tr>
</tbody>
</table>

*p < 0.05  b p < 0.01  c p < 0.001

Note: The scales used are from 1 to 7. For ORG, IMPLMN, DBASE, HWARE and COST problems, higher values signify greater ISP problems whereas for PERFORM, higher values signify greater IS contributions to organizational performance.
### Table 5
Post-hoc comparisons using Scheffe tests

<table>
<thead>
<tr>
<th>Performance Measures</th>
<th>Pairwise Comparisons (p &lt;0.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ORG</td>
<td>Administrative &gt;&gt; Sequential</td>
</tr>
<tr>
<td></td>
<td>Administrative &gt;&gt; Reciprocal</td>
</tr>
<tr>
<td></td>
<td>Administrative &gt;&gt; Full</td>
</tr>
<tr>
<td></td>
<td>Sequential &gt;&gt; Reciprocal</td>
</tr>
<tr>
<td>IMPLMN</td>
<td>Administrative &gt;&gt; Reciprocal</td>
</tr>
<tr>
<td></td>
<td>Administrative &gt;&gt; Full</td>
</tr>
<tr>
<td></td>
<td>Sequential &gt;&gt; Reciprocal</td>
</tr>
<tr>
<td></td>
<td>Administrative &gt;&gt; Sequential</td>
</tr>
<tr>
<td></td>
<td>Administrative &gt;&gt; Reciprocal</td>
</tr>
<tr>
<td></td>
<td>Administrative &gt;&gt; Full</td>
</tr>
<tr>
<td></td>
<td>Reciprocal &gt;&gt; Administrative</td>
</tr>
<tr>
<td></td>
<td>Reciprocal &gt;&gt; Sequential</td>
</tr>
<tr>
<td></td>
<td>Full &gt;&gt; Sequential</td>
</tr>
</tbody>
</table>

>> signifies significantly greater than (at p =0.05)

The data are plotted in Figure 1 to determine whether there are any distinct trends among the performance measures. It is apparent that ISP problems are generally less severe at reciprocal or full integration. With the exception of COST, other ISP problems show a distinct decreasing trend across the types of integration.

As expected, the extent of IS contributions to organizational performance increases as the firm moves toward greater integration. However, there appears to be a pronounced increase in the extent of IS contributions to organizational performance as the firm moves from reactive types (i.e., administrative or sequential integration) to proactive types. This is perhaps due to a more proactive role of the IS function in supporting and influencing the firm's strategy at reciprocal or full integration. More importantly, this result provides empirical evidence for the beneficial impact of proactive BP-ISP integration in increasing the extent of IS contributions to organizational performance.

The extent of IS contributions to organizational performance was measured in terms of increased ROI, increased market share of products/services, improved internal efficiency of operations, increased annual sales revenue, and increased customer satisfaction.

The contributions of IS to improve internal efficiency reflect the traditional role of IS in automating work processes. However, in recent years, the focus has shifted from routine automation to business process reengineering in order to reap dramatic rather than incremental improvements in productivity from the use of IT [11]. The contributions of IS to increase customer satisfaction, perhaps reflect the increased use of IT to provide better services. Recent research (e.g., [18]) has shown that strategic applications of IT are commonly directed at improving internal operations and providing better services to customers; e.g., easy access to accurate and timely order information. These enhanced services usually improve customer satisfaction and help to encourage customer loyalty, thereby also contributing to improved organizational performance.

#### 5.2. Comparisons of ISP Problems at Various Integration Levels

In order to seek greater insight into the meaning of these statistical results, comparisons of ISP problems among the four types of BP-ISP integration were made, as shown in Figure 2.

ORG, IMPLMN, DBASE and HWARE problems can be seen to generally show a decreasing trend, as expected, across the successive types of integration due to the presence of greater coordination between BP and ISP at later types of integration. COST problems generally did not vary much across the types of integration. COST problems are relatively low at administrative integration, probably because minimal attention is paid to ISP. Since IS applications at administrative integration are generally routine and non-strategic, less time and resources are required. As the firm begins to leverage IT to support business strategies, there is a resulting dominance in COST problems, relative to other ISP problems.

IMPLMN problems are dominant in administrative integration and remained dominant, though decreasing in magnitude, at each successive types of integration. This implies that although there is a reduction in the extent of IMPLMN problems across the successive types of integration due to better...
Fig. 1. Bar charts showing variations of performance measures with types of integration.

coordination between business and IS, IMPLMN problems remain a key issue. One possible reason is that the elusive link between investments in IT and organizational performance may result in the lack of top management support and commitment for implementing IS plans.

DBASE problems are more dominant than HWARE problems across the successive types of integration, probably because hardware planning is less complex than database planning, probably due to the difficulty of finding the appropriate balance between the cost (e.g., decreased flexibility due to
greater interdependence among units) and benefits (e.g., reduced data redundancy) of increased data integration [8].

ORG problems are reduced significantly at each successive type of integration, since problems such as those relating to a failure to take into account organizational goals and strategies, and assess the current IS applications portfolio, are more likely to be resolved when there is greater BP-ISP integration. As well, problems relating to the failure to involve users, and make appropriate and realistic planning assumptions, can be mitigated.

The decreasing trends in ORG, IMPLMN, DBASE and HWARE problems reinforce the suggestion that ISP problems are less severe when ISP is strategic (as in reciprocal or full integration) than when ISP is financial/tactical and that COST remained constant regardless of the orientation of ISP.

6. Conclusions

Despite the presumed importance of BP-ISP integration, there is relatively little empirical research focusing specifically on it. This research builds on and expands existing research literature on BP-ISP integration, and hence helps to establish a cumulative tradition.

The significant positive relationship that was found between the extent (type) of BP-ISP integration and the extent of IS contributions to organizational performance provides empirical evidence of the importance of BP-ISP integration. This evidence is reinforced by the fact that the type of integration and IS contributions to organizational performance are measured using different respondents in the same firm, thereby reducing common source variance.

This result also suggests that the notion of IS contributions to organizational performance might only be applicable when there is proactive BP-ISP integration (as in reciprocal or full integration). The extent (type) of integration also was found to have a significant negative relationship with the extent of organization, implementation, database and hardware problems, and a negligible relationship with cost problems. This confirms the benefits of greater BP-ISP integration in mitigating ISP problems possibly by facilitating greater communication and understanding between top management and IS management.
Appendix A. Sample Questionnaire

BP–ISP Integration

Please indicate with a check mark (✓) the description that most closely fits your current BP–ISP integration

( ) Administrative Integration

Business → Information Systems Planning

In this type of integration, there is a weak relationship between Business Planning (BP) and Information Systems Planning (ISP) as shown by the arrow given above. Generally there is little significant effort to use Information Technology (e.g., computers, telecommunications) to support business plans.

( ) Sequential Integration

Business → Information Systems Planning

In this type of integration, a sequential relationship exists between Business Planning (BP) and Information Systems Planning (ISP). BP provides directions for ISP. This relationship is denoted by a unidirectional arrow flowing from BP to ISP. ISP primarily focuses on providing support for business plans.

( ) Reciprocal Integration

Business ↔ Information Systems Planning

In this type of equation, there is a reciprocal and interdependent relationship between Business Planning and Information Systems Planning (ISP). There are therefore two arrows shown above; one arrow flowing from BP to ISP, and the other from ISP to BP. ISP plays a role in both supporting and influencing business plans.

( ) Full Integration

Integrated Planning

In this type of equation, there is little distinction between the Business Planning and the Information Systems Planning (ISP) process. Business and information systems strategies are developed concurrently in the same integrated planning process.

The following items are on a 7-point scale: '1' Strongly Disagree, '2' Disagree, '3' Mildly Disagree, '4' Neutral, '5' Mildly Agree, '6' Agree, '7' Strongly Agree. Actual items are interspersed in questionnaire. (R) represents items which are reverse coded.

ISP Problems (adapted from Lederer and Sethi [23, 25])

Organization Problems

1. Information Systems Planning (ISP) adequately takes into account organizational goals and strategies. (R)
2. ISP fails to adequately assess the current information systems applications portfolio.
3. ISP fails to adequately involve users.
4. Appropriate and realistic assumptions are made during ISP. (R)
5. The Information Systems (IS) plan provides a statement of objectives for the information systems department. (R) [Dropped]

Implementation Problems

1. ISP fails to adequately involve top management.
2. It is very difficult to secure top management commitment for implementing the IS plan.
3. Implementing the objectives identified in the IS plan requires substantial further analysis.
4. The IS plan is in accordance with the expectations of top management. (R)
5. The IS plan is very useful. (R) [Dropped]
6. ISP adequately takes into account issues related to plan implementation. (R) [Dropped]

Database Problems

1. The IS plan adequately addresses the need for data/database administration. (R)
2. The IS plan provides priorities for developing specific databases. (R)
3. The IS plan includes an overall data architecture plan. (R)

Hardware Problems

1. The IS plan includes an overall hardware plan. (R)
2. The IS plan includes an overall data communications plan. (R)

Cost Problems

1. The ISP process takes a significantly longer time than expected.
2. The ISP process is very expensive.

**IS Contributions to Organizational Performance**
(adapted from Premkumar and King [34])

In our organizational unit, the information systems function has contributed significantly to:

a. increased ROI.
b. increased market share of products/services.
c. improved internal efficiency of operations.
d. increased annual sales revenue.
e. increased customer satisfaction.

Note: (R) signifies reverse coding. [Dropped] signifies item has been eliminated to improve reliability.

**References**


