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Top Management Support, External Expertise and Information Systems Implementation in Small Businesses

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Top management support is a key recurrent factor critical for effective information systems (IS) implementation. However, the role of top management support may not be as critical as external IS expertise, in the form of consultants and vendors, in small business IS implementation due to the unique characteristics of small businesses. This paper describes an empirical study of the relative importance of top management support and external IS expertise on IS effectiveness in 114 small businesses. Partial least squares (PLS) was used for statistical testing. The results show that top management support is not as important as effective external IS expertise in small business IS implementation. While top management support is essential for IS effectiveness, high quality external IS expertise is even more critical for small businesses operating in an environment of resource poverty. These findings call for more research efforts to be directed at selecting and engaging high quality external IS expertise for IS implementation in small businesses.

(*Top Management Support; External Expertise; Consultant; Vendor; Small Businesses*)

1. Introduction

Top management support has been identified as a key recurring factor critical to information systems (IS) effectiveness in both large and small businesses (see Cerveny and Sanders 1986, DeLone 1988, Ginzberg 1981, Keen and Scott-Morton 1978, Kwon and Zmud 1987, Lucas 1981, Yap et al. 1992). Kwon and Zmud (1987) asserted that successful IS implementation occurs when sufficient organizational resources (sufficient developer and user time, sufficient funding, sufficient technical skills, etc.) are directed toward, first, motivating and then sustaining the implementation effort. By virtue of their leadership role, top management are able to ensure sufficient allocation of resources and act as a change agent to create a more conducive environment for IS implementation (Lucas 1981). Top management have the authority to influence other members of the business, and are more likely to succeed in overcoming or-

ganizational resistance to accept the IS (Keen 1981, Markus 1983). Strong top management commitment is expected to lead to superior conversion effectiveness (the way IS is converted to productive outputs) and thus better IS performance for the same level of IS investment (Weill 1992). Jarvenpaa and Ives (1991) noted that hands-on management in IS projects might be much more important in a small business where the CEO commonly makes most key decisions and is perhaps the only one who can harness information technology (IT) to corporate objectives and strategy. A supportive CEO is more likely to commit scarce resources and adopt a longer-range perspective to the benefits of IS implementation.

IT can help small businesses to develop their markets, increase sales turnover, raise profitability, secure their positions within the industries, and gain a competitive edge (Clark 1987, Dwyer 1990, Lincoln and Warberg 1987, Massey 1986, Poutsma and Walravens 1989).

However, small businesses face substantially greater risks in IS implementation than larger businesses due to their unique characteristics (Ein-Dor and Segev 1978, West 1975, Whistler 1970).

Organizational theories and practices that are applicable to a large business may not fit a small business (see Blau et al. 1966, Blili and Raymond 1993, Cohn and Lindberg 1972, Raymond 1985, Senn and Gibson 1981). There is a need to take off the "big-organization glasses" and look at small businesses separately, not in the relational view commonly used (Dandridge 1979). A small business is not a scale model of a large business. Small businesses tend to have simple and highly centralized structures with the chief executive officers (CEOs) making most of the critical decisions (Mintzberg 1979). They also tend to employ generalists rather than specialists. Operating procedures are not written down or standardized. In addition, small businesses suffer from resource poverty such as financial constraints, lack of professional expertise, and susceptibility to external forces, because they are operating in a highly competitive environment (Welsh and White 1981). Hence, they have to watch their cash flows carefully, do not have the necessary in-house IS expertise, and tend to have a short-range management perspective with regard to IS implementation.[1] While it is true that large businesses also suffer from many of the same constraints, the effect on small businesses is more significant. Skills, time, and staff necessary for planning are not major issues in large businesses, yet these same issues represent most of the planning related management difficulties of small businesses (Cohn and Lindberg 1972). Small businesses tend to choose the lowest-cost IS which may be inadequate for their purpose and underestimate the amount of time and effort required for IS implementation (Yap 1989a). Thus, inadequate planning for IS implementation increases the risk of implementation failure. Further, few small businesses utilize management techniques such as financial analysis,

forecasting, and project management (D'Amboise and Gasse 1990). The decision process of small business managers are more intuitive, based on "guesswork" and less dependent on formal decision models (Rice and Hamilton 1979).

Due to the unique characteristics of small businesses, the roles played by top management support, external consultants, and vendors in small businesses may be significantly different from that in large businesses. Because of the much simpler organization structure, there are relatively limited political problems in small businesses and the role of top management as a "fixer" in IS implementation may not be as important as in large businesses. In contrast, because of the lack of in-house IS expertise, small businesses are likely to be much more dependent on external IS expertise such as consultants and vendors (Couger and Wergin 1974, Senn and Gibson 1981). Small businesses generally lack computer experience and do not have sufficient internal IS expertise (DeLone 1988, Gable 1991). Further, small businesses face difficulties in recruiting and retaining internal IS experts due to scarce qualified IS experts and limited career advancement prospects. Hence, while top management support is important for IS implementation, external IS expertise may be even more important in the small business context.

Recently, Attewell (1992) proposed a theory of technology diffusion to explain adoption of business computing by organizations. His theory emphasizes organizational learning and the role of external entities such as consultants and IT vendors as knowledge providers to lower the knowledge barrier or knowledge deficiency on the parts of potential IT adopters. Businesses tend to delay in-house adoption of IT because they have insufficient knowledge to implement and operate IT successfully. In response to this knowledge barrier, mediating entities come into existence which progressively lower this barrier, and make it easier for businesses to adopt and use IT without extensive in-house expertise. These mediating entities can capture economies of scale in learning. After developing many accounting systems, the IT vendor would have learned from earlier attempts and develop a relatively error-free system. Similarly, the consultant would have acquired a wealth of experience in IS implementation. Hence, external consultants and IT vendors can play an important role in

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[1] In this paper, we adopt Lucas' (1981) definition of IS implementation as not the final stage in the systems life cycle but as an on-going process which includes the entire development of the system from the original suggestion through the feasibility study, systems analysis and design, programming, training, conversion, and installation of the system.

assisting businesses, especially small businesses, to adopt IS successfully.

The above discussion suggests a need to reexamine the role of top management support in IS implementation in small businesses. Given Attewell's (1992) theory of lowering knowledge barrier, it is important to compare the effects of top management support vis-a-vis external IS expertise in small business IS implementation. Is top management support indispensable in IS implementation? Does the importance of top management support overwhelm the influence of external IS expertise in small business IS implementation or vice versa? Or, are the two factors equally critical? These questions are important as external IS expertise has not been compared with the role of top management support in IS implementation. Further, prior studies on external IS expertise have been prescriptive in nature or based on case studies (Gable 1991, Kole 1983, Newpeck and Hallbaur 1981, Senn and Gibson 1981). These research questions also have practical implications for small businesses contemplating engaging external IS experts. If top management support is more important than external IS expertise, future IS implementation efforts should continue to focus on securing high levels of top management support, as prescribed in the IS literature. Researchers would then need to explore the best ways to secure top management support. Conversely, if external IS expertise is found to overwhelm the influence of top management support, practitioners and researchers should pay more attention to the roles of external consultants and vendors in IS implementation. Future research should then be directed at identifying attributes of "good" or "effective" consultants and vendors, and developing effective approaches for engaging consultants and vendors.

The rest of this paper is organized as follows. In §2, the research model and propositions are discussed in detail. Section 3 describes the research methodology adopted for this study. Section 4 describes the data analysis technique and presents the results of propositions testing. In §5, the results are discussed. Finally, §6 summarizes and concludes the paper.

2. Research Model

Figure 1 shows the conceptual model in this research. The IS implementation environment is conceptualized

Figure 1   **Conceptual Model**
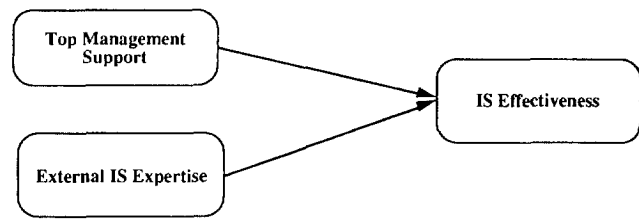
in terms of top management support and external IS expertise. The conceptual model is based on the theory that small businesses lag behind larger businesses in the use of IS due to resource poverty, and top management support and external IS expertise are two key factors that can alleviate the poverty. We will elaborate on these two factors below.

2.1. Top Management Support

The importance of top management support in IS implementation has been recognized often in the IS literature since the late 1960s (Argyris 1971, Dean 1968, Diebold 1969, Senn 1978). More recently, it has been preached religiously in numerous text books on information systems management (Cash et al. 1992, Earl 1989, Lucas 1986, Sprague and McNurlin 1986). There is also ample evidence of the importance of top management support for effective IS in the case study literature (e.g. Elam 1988, Stoddard 1986, Vitale 1988, Yap 1989b) and empirical studies in both small and large businesses (Bruwer 1984, Couger and Wergin 1974, DeLone 1988, Doll 1985, Greenwood 1981, Newpeck and Hallbaur 1981, Sanders and Courtney 1985, Vanlommel and De Brabander 1975, Yap et al. 1992).

Yap (1989b) offered two reasons why top management should be supportive of IS implementation. First, top management, with their broader perspectives, are in a better position than system analysts to identify business opportunities for the exploitation of IT. This is especially true in a small business where the CEO is the person who understands the business best. Second, IS implementation involves huge investments and often has organization-wide implications. The future of the business may be jeopardized by unsuccessful investments in IS because a technical failure in the IS can have a major negative impact on the business that is heavily dependent on it. The setback has even greater implica-

tion for a small business as it may even result in business failure (Senn and Gibson 1981). Due to their unique characteristics, small businesses have a much higher mortality rate than large businesses (Singh et al. 1986). Ginzberg (1981) found that top management commitment to the IS project and to organizational change can differentiate between successful and unsuccessful IS implementation. Visible top management support encourages positive attitudes on the part of users toward use of the IS and leads to a smoother conversion from the existing work procedures.

Essentially, top management support can take the form of managerial guidance in planning, design, development, and implementation activities (Bruwer 1984). Other avenues of top management support include written overall development plans, mutually agreed upon development priorities, long-term funding commitments, system planning objectives, and project development policies (Benjamin et al. 1984, Doll 1985, Ives and Learmonth 1984, Porter and Millar 1985). While top management can be supportive of IS implementation through participation in executive steering committees in large businesses (Nolan 1982, Raghunathan 1992, Raghunathan and Raghunathan 1989), the approach in small businesses tends to be informal with no official committees. There are usually no written plans or policies. Essentially, the CEO of a small business attends project meetings with the external IS experts to specify the business requirements, to clarify issues related to the project, and to monitor the progress of the project.

2.2. External IS Expertise
Small businesses rely on consultants and vendors in their IS implementation projects. The effectiveness of consultants and the quality of vendor support are important for successful IS implementation.

2.2.1. Consultant Effectiveness.
The IS literature contains mainly descriptive surveys and case studies on the engagement of consultants. These studies are mainly practitioner-oriented and tend to prescribe approaches to select, install, use, and control information systems. For example, Senn and Gibson (1981) strongly recommended engaging a consultant who has technical expertise as well as knowledge of small business operations. Newpeck and Hallbauer (1981) believed that an outside consultant is imperative to making the best decisions regarding the acquisition and use of information systems. Based on case studies, Gable (1989) and Kole (1983) found that the experience and capabilities of the consultant or consultant effectiveness plays an important role in IS implementation in small businesses. There is also some empirical evidence that IS effectiveness is positively correlated with consultant effectiveness (Yap et al. 1992).

The primary duties of a consultant are to provide consultancy service specifically to help businesses implement effective information systems. Consultancy service can include performing information requirements analysis, recommending suitable computer hardware and software, and managing implementation of the information systems.

Intuitively, we would expect small businesses, due to insufficient internal technical expertise, to engage some form of external IS expertise. Simon (1990) pointed out four advantages of engaging external consultants over employing internal IS staff. First, the small businesses need not maintain expensive internal IS staff when the IS implementation is completed and maintenance is infrequent. Second, they need not provide expensive ongoing professional training for the internal IS staff to keep up with advancing technology. Third, it is difficult to engage qualified internal IS staff due to their scarcity and the limited career advancement prospects in a small business. Fourth, the increasingly complex technology will require hiring of various specialists which is not feasible in small businesses.

However, there appears to be a lack of understanding of the consulting process by small businesses. They tend to overestimate the impact of external IS experts in achieving effective IS implementation, and underestimate the importance of their own involvement. Lees (1987) found that if the consultants have inadequate experience and abilities, decreased top management involvement may have negative effects on user satisfaction and system usage. There is a need for pro-active top management involvement in IS implementation even when a consultant is engaged (Gable 1991).

2.2.2 Vendor Support.
Vendor support is another form of external IS expertise for the resource-limited small businesses. With little internal computer expertise,

small businesses are very reliant on the advice and support from vendors (Cragg and King 1993). The literature on vendor support has tended to be descriptive in nature. Typical of this genre, Heintz (1981) discussed three approaches to engaging vendors in IS implementation: (1) rely on vendor advice, (2) start with a simple IS and take one step at a time, and (3) prepare a formal request-for-proposal; and concluded that the last approach is the most desirable. This approach assumes, correctly or incorrectly, that the small business has enough expertise to prepare a formal request-for-proposal that has realistic expectations. Other popular recommendations include checking on vendors' credentials and purchasing hardware and software from reputable vendors with large customer base (Cheney 1983, Garris and Burch 1983, Greenwood 1981, Lees and Lees 1987, Newpeck and Hallbaur 1981, Pipino and Necco 1981). There is also empirical evidence to suggest positive relationships between measures of IS effectiveness and vendor support (Lees 1987, Wong 1986, Yap et al. 1992).

The duties of a vendor generally include providing the computer hardware, software packages, technical support, and training of users. In some cases, a vendor also plays the role of a consultant. For small businesses that want to implement basic operational systems, a vendor often can provide the same level of consultancy service as a specialized consultant (Thong et al. 1994).

A common concern of some researchers is the lack of independence of vendors (Heintz 1981, Senn and Gibson 1981). The vendors may recommend products in which they have a vested interest but which may not suit the requirements of the small business (Yap 1989a). If this is allowed to occur, the small business may have to modify requirements to suit the products offered by the vendors and settle for a less effective information system. Alternatively, the small business may have to change work procedures, for better or worse, to work with the new system. To some extent, the problems arising from a lack of independence of vendors may be ameliorated by the highly competitive IT market place which dictates that the prices of similar products do not vary drastically and the products must meet acceptable standards (Thong et al. 1994). Computer hardware, especially personal computers, and software are becoming standardized commodity products. It is also not uncommon to find different vendors marketing the same products. Hence, vendors are compelled to provide quality products and services at reasonable prices to remain competitive.
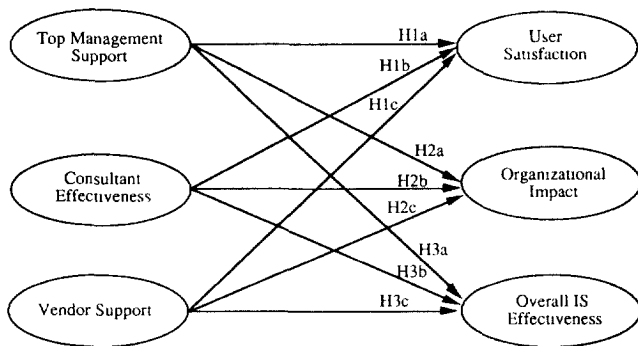
2.3. IS Effectiveness

IS effectiveness may be defined as the extent to which an information system actually contributes to achieving organizational goals, i.e., its effect on organizational performance (Hamilton and Chervany 1981, Raymond 1990). However, there is no consensus among IS researchers on the conceptualization and operationalization of IS effectiveness (DeLone and McLean 1992, Goodhue 1992, Srinivasan 1985). Approaches to measure IS effectiveness that have been utilized in previous research include cost-benefit analysis, system usage estimation, user satisfaction, incremental performance in decision-making effectiveness, information economics, utility analysis, analytic hierarchy approach, and information attribute examination (Srinivasan 1985). Based on a review of the literature on IS effectiveness, DeLone and McLean (1992) concluded that it is unlikely that any single, overarching measure of IS effectiveness will emerge; and so multiple measures will be necessary, at least in the foreseeable future. In this study, IS effectiveness is measured by user satisfaction, organizational impact, and overall IS effectiveness. These measures are discussed further in §3.1.

2.4. Propositions

In this study, the main research question is to examine the relative importance of top management support and external IS expertise in small business IS implementation. This research question can be tested through partial least squares (PLS), a powerful structural equation modeling technique, by examining the relative size and significance of the path coefficients (Chin and Gopal 1993). Hence, we formulate our propositions in terms of a causal model. The propositions derived from the research model are now described (see Figure 2).

2.4.1. Top Management Support. In environments with low level of top management support, top management may approve the purchase of the computer system but are not involved in other aspects of IS implementation. They may not attend project meetings or be involved in information requirements analysis, re-

Figure 2   Research Model

view of consultant's recommendations, participate in decision-making, or monitor the project. Hence, IS effectiveness is expected to be low when the level of top management support is low. In environments which have a high level of top management support, members of top management will attend project meetings regularly and will be involved in information requirements analysis, review consultant's recommendations, participate in decision-making, and monitor the project. Hence, IS effectiveness is likely to be high when the level of top management support is high.

PROPOSITION 1a.   *Greater top management support will result in greater user satisfaction.*

PROPOSITION 1b.   *Greater top management support will result in greater organizational impact.*

PROPOSITION 1c.   *Greater top management support will result in greater overall IS effectiveness.*

2.4.2. Consultant Effectiveness.   The level of consultant effectiveness is low when the consultant does not conduct a proper information requirements analysis, recommends an IS which turns out to be ineffective, manages implementation badly, and has poor working relationships with other parties in the project. Under such environments, the level of IS effectiveness is likely to be low. Conversely, when the level of consultant effectiveness is high, the level of IS effectiveness is likely to be high.

PROPOSITION 2a.   *Greater consultant effectiveness will result in greater user satisfaction.*

PROPOSITION 2b.   *Greater consultant effectiveness will result in greater organizational impact.*

PROPOSITION 2c.   *Greater consultant effectiveness will result in greater overall IS effectiveness.*

2.4.3. Vendor Support.   The level of vendor support is low when the vendor is unreliable, provides inadequate and poor technical support, gives insufficient and poor training, and blames hardware and software problems on other parties. Consequently, the implemented IS may fail to satisfy user requirements and do not produce the expected benefits. Hence, the level of IS effectiveness is likely to be low when the level of vendor support is low. Conversely, the level of IS effectiveness is expected to be high when the level of vendor support is high.

PROPOSITION 3a.   *Greater vendor support will result in greater user satisfaction.*

PROPOSITION 3b.   *Greater vendor support will result in greater organizational impact.*

PROPOSITION 3c.   *Greater vendor support will result in greater overall IS effectiveness.*

3.   Research Methodology
This section describes the operationalization of constructs, the survey sample, and the data collection procedure. The characteristics of the survey sample are also presented.

3.1. Measures
The measures used in this study have either been formally validated in previous methodological studies or have been used previously in empirical studies. Table 1 presents the operationalization of the constructs.

3.1.1. Top Management Support.   Active engagement of top management with IS implementation is highly desirable in businesses of every size (Rockart and Crescenzi 1984). In the case of a small business, top management is synonymous with the CEO. This is because most small businesses have a flat organizational structure and are managed by the owner who is usually the CEO (Raymond and Magnenat-Thalmann 1982, Solomon 1986). The CEO is the most influential person in a small business and his or her influence has a much

Table 1   Operationalization of Constructs

Construct	Measure	Scale
Top Management Support	1. CEO attendance at project meetings 2. CEO involvement in information requirements analysis 3. CEO involvement in reviewing consultant's recommendations 4. CEO involvement in decision-making 5. CEO involvement in monitoring project	7 point scale Yap et al. (1994)
Consultant Effectiveness	1 effectiveness in performing information requirements analysis 2. effectiveness in recommending suitable computer solution 3. effectiveness in managing implementation 4. relationship with other parties in the project (CEO, Users, Vendor)	7 point scale Thong et al. (1994)
Vendor Support	1. adequacy of technical support during IS implementation 2. adequacy of technical support after IS implementation 3. quality of technical support 4. adequacy of training provided 5. quality of training provided 6. relationship with other parties in the project (CEO, Users, Consultant)	7 point scale Thong et al. (1994)
User Satisfaction	1. convenience of access 2. currency of reports 3. timeliness of reports 4. reliability of reports 5. relevancy of reports 6. accuracy of reports 7. completeness of reports	7 point scale Adapted from Raymond (1987)
Organizational Impact	1. pre-tax profit 2. sales revenue 3. staff productivity 4. competitive advantage 5. operating cost 6. quality of decision-making	7 point scale Adapted from DeLone (1990)
Overall IS Effectiveness	1. Overall IS effectiveness	7 point scale

wider impact than his or her counterpart in a large business (Doukidis et al. 1992). The CEO is also the main information user and decision-maker in a small business and is in the best position to identify critical business applications to computerize. Hence, in this study, top management support is measured by CEO support, a measure proposed and validated by Yap et al. (1994).[2] The measure consists of six items: (1) frequency of attendance at computerization project meetings, (2) level

of involvement in information requirements analysis, (3) level of involvement in reviewing consultant's recommendations, (4) level of involvement in decision-making relating to the computerization project, and (5) level of involvement in monitoring the project. These items reflect the major IS implementation stages in a small business.

3.1.2. Consultant Effectiveness. In this study, there is a need to assess the consultant's performance in different stages of IS implementation. The measure of consultant effectiveness was proposed and validated by Thong et al. (1994). It is based on the IS implementation life cycle, and comprises the following items: (1) consultant effectiveness in performing information requirements analysis, (2) consultant effectiveness in recom-

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[2] The measure was developed through an extensive literature review followed by iterative reviews by both practitioners and experienced small business researchers. The measure was then pilot-tested in the field followed by a questionnaire survey. It was found to demonstrate adequate reliability and validity.

mending suitable computerization solution, (3) consultant effectiveness in managing the IS implementation project, and (4) relationship between consultant and other parties in the project (CEO, users, and vendor).

3.1.3. Vendor Support.
Thong et al. (1994) developed and validated a measure of vendor support based on a review of vendor support literature (Heikkila et al. 1991, Lees 1987, Lucas et al. 1988, Soh et al. 1992, Wong 1986, Yap et al. 1992). The measure consists of six items: (1) adequacy of technical support during implementation, (2) adequacy of technical support after implementation, (3) quality of technical support, (4) adequacy of training provided, (5) quality of training provided, and (6) relationship between vendor and other parties (CEO, users, consultant) in the IS implementation project. This measure takes into consideration the adequacy and the quality in addition to the amount of technical support and training provided. The adequacy of technical support and training provided do not fully reflect the effectiveness of the technical support and training provided respectively. Quality of these services is also important. It is also necessary to measure the adequacy of technical support during and after implementation. The effectiveness of vendor support may deteriorate after the information system has been delivered and payment has been made.

3.1.4. IS Effectiveness.
The first measure of IS effectiveness, user satisfaction, is an attitudinal measure toward use of the resulting information systems. This measure of IS effectiveness is popularly operationalized by the Bailey-Pearson instrument and its derivatives: Ives-Olson-Baroudi (1983), Baroudi-Orlikowski (1988), and Raymond (1987). In small business research, user satisfaction has often been utilized as a dependent variable (Lees 1987, Montazemi 1988, Raymond 1985, Raymond 1990, Soh et al. 1992, Thong et al. 1994, Yap et al. 1992, Yap et al. 1994). Recently, a number of IS researchers have expressed reservations over these instruments and measurement of user satisfaction in general (Doll and Torkzadeh 1988, Galletta and Lederer 1986, Goodhue 1986, Iivari 1987, Kim 1989, Klenke 1992, Melone 1990, Treacy 1985). Despite these criticisms, user satisfaction instruments are still used widely in research on IS implementation in both large and small businesses. This is because there are no other equivalent instru-

ments that can supersede them satisfactorily. Moreover, the use of previously developed standard instruments allows for comparison of results with other similar studies and accumulation of knowledge.

The second measure of IS effectiveness, organizational impact, is a perceptual measure of the impact of an information system on the performance of the business. An information system is only effective when it contributes to organizational effectiveness. In a small business, the impact of the information system is likely to be achieved by time savings, and formalizing and restructuring of work processes (Heikkila et al. 1991). DeLone (1990) suggested that organizational impact may be measured in terms of profit, sales revenue, staff productivity, competitive advantage, operations efficiency, and improved decision-making. All six items are used to measure organizational impact in this study. This measure of organizational impact is necessarily broad as there are many dimensions to it. Ideally, objective data of costs and benefits should be collected at two points in time: before and after IS implementation. However, as pointed out by Lucas (1981), costs and benefits of information systems are difficult to quantify, and objective assessment of benefits of information systems for decision support often cannot be demonstrated with any certainty. Further, even if data on IS effectiveness may be determined, they are usually not recorded and thus not available. In view of the operationalization difficulties with economic analysis of the value of information systems, a perceptual measure of organizational impact is used in this study.

Finally, an overall measure of IS effectiveness is included. This overall measure is included as we want to capture the respondents' conceptualization of IS effectiveness which may be different from ours.

3.2. The Sample
There is no generally accepted definition of a small business. Three commonly used criteria for defining a small business are number of employees, annual sales, and fixed assets (Chew 1988, Ibrahim and Goodwin 1986). In this study, the criteria for defining a small business are adopted from the Association of Small and Medium Enterprises (ASME) in Singapore. A small business is one that satisfies at least two of the following criteria: (1) the number of employees in the business should not

exceed 100; (2) the business's fixed assets should not exceed US $7.2 million; and (3) the business's annual sales should not exceed US $9 million.

The names and addresses of small businesses that have computerized were obtained from a small business database maintained by the National Computer Board (NCB) in Singapore. The NCB conducts a national IT survey on a large cross-section of business organizations every two years. Stratified random sampling was used to ensure that the sample was representative of the national profile. Hence, our sample is not a convenient sample per se. Nonprofit businesses, public-listed businesses, and wholly owned subsidiaries of large businesses were excluded from the survey sample. Three hundred and four small businesses fulfill the ASME criteria and were included in the study. Two weeks after the questionnaires were mailed, follow-up telephone calls were made to nonresponding businesses to encourage a higher response rate. One hundred and thirty small businesses responded, giving a response rate of 43 percent. This response rate is considered reasonable notwithstanding that the survey was unsolicited, without any prior knowledge on the part of the respondents. The remaining businesses declined to participate due to reasons of time pressures and confidentiality. Responses from 16 businesses were excluded from the final sample because they had too much incomplete data. This resulted in 114 usable sets of questionnaires. In order to assess the possibility of non-response bias, we compared the responses of the early returns to late returns as suggested by Armstrong and Overton (1977). The MANOVA test did not detect any significant differences in the research variables. Hence, non-response bias was not considered to be a problem.

3.3. Data Collection

The study was conducted in Singapore in two phases: a pilot study and a questionnaire survey. Two questionnaires, the Project Manager Questionnaire and the Computer User-Manager Questionnaire, were designed for data collection.

In the pilot study phase, five small businesses were randomly chosen from the small business database to pre-test the questionnaires. Five project managers and fifteen computer user-managers completed the ques-

tionnaires. Next, interviews were conducted with these project managers and computer user-managers to determine whether there were any problems with the questionnaires. Through these interviews, it was possible to identify inconsistencies with the questionnaire data and to check that the respondents understood the questions. Based on feedback from these small businesses, very minor modifications were made to the questionnaires for the next phase of the study. Responses from the five pilot study businesses were not included in the final sample.

In the questionnaire survey, a package was mailed to the CEO of each of the small businesses in the survey sample. The package contained four items: a covering letter; one Project Manager Questionnaire; three Computer User-Manager Questionnaires; and a reply-paid envelope. The covering letter requested permission from the CEOs to conduct a survey on the most major IS implementation project in their businesses. If the CEOs agreed, they were asked to pass the relevant questionnaires to the manager in charge of the IS implementation project and three computer user-managers. The completed questionnaires were to be returned to us within two weeks in the reply-paid envelope. The respondents were assured of the confidentiality of their responses. As a further safeguard, they could return the questionnaires in individually sealed envelopes. The Project Manager Questionnaire was completed by the in-house person who is administratively responsible for the IS implementation. It solicited data on: (1) levels of CEO support, consultant effectiveness, and vendor support; (2) levels of organizational impact and overall IS effectiveness; and (3) information systems characteristics such as hardware type and software applications. The Computer User-Manager Questionnaires were to be completed by three managers who were users of their companies' computer systems and computer-produced reports. We chose to survey three respondents in order to get more representative responses. The Computer User-Manager Questionnaire requested data on user satisfaction. Where necessary, follow-up telephone calls were made to obtain missing data and gain insights into responses. In cases where the respondent had inadvertently left out responses to questions (e.g. skipped a section accidentally), he or she was interviewed over the phone, otherwise no change was made

to the missing data. Thus, there is no risk of significant researcher bias or confounding having crept into the survey data.

A member of the research team visited 67 of the small businesses to conduct separate interviews with the project managers and computer user-managers subsequent to their completion of their respective questionnaires. As far as possible, all computer user-managers in the businesses were included in the study. Responses from the project manager and computer user-managers were not revealed to each other or the CEOs of the businesses. During the interviews, respondents were asked to explain in greater detail their responses to the questionnaires and to qualitatively relate their experience with the IS implementation projects. The interviews helped us to interpret the questionnaire data through deeper insights into IS implementation issues faced by small businesses. To check whether the CEOs in the non-interviewed businesses were biased in selecting users who were more satisfied, a MANOVA test was conducted on all items of constructs between the 67 interviewed businesses and the 47 non-interviewed businesses. No significant difference was found (Wilks' λ = 0.592; p = 0.221). Thus, there is no evidence of significant selection bias or confounding having crept into the data.

As the unit of analysis is at the organization level rather than at the individual user level, computer user-managers' responses for user satisfaction were aggregated within each small business for purpose of statistical analysis. The aggregation of responses does not necessarily result in bias if it can be justified on a theoretical basis (Langbein and Lichtman 1978). In this study, respondents are members of top management in the small businesses and have an overall view of IS effectiveness in their respective businesses. Hence, their satisfaction levels are representative of the user satisfaction of top management within their businesses. Analysis of variance revealed significantly greater variance on user satisfaction between the small businesses than within them (F = 2.30; F-prob = 0.000).

Quantitative data on the organizational characteristics (e.g. business sector, number of employees, annual sales) of the small businesses were obtained from the Registry of Companies and Businesses (RCB) and the Central Provident Fund Board (CPF Board) in Singa-

pore. All businesses are required to lodge their annual reports with the RCB while the CPF Board maintains data on the number of employees in all businesses in Singapore.

3.4. Characteristics of the Sample

Table 2 presents the characteristics of the survey sample. The responding small businesses are from the manufacturing, commerce, and service sectors. They all satisfied the criteria of a small business as defined earlier. There are 5 businesses with more than 100 employees and 25 businesses with annual sales above US $9 million. Most of these businesses with large annual sales are in the commerce sector that tend to have small number of employees. On average, small businesses in the sample have 50 employees and the mean annual sales is US $6 million. These figures are comparable to those found in previous studies on small businesses. For example, DeLone's (1988) sample averaged 62 employees and US $5 million in annual sales. The small businesses have a mean of four years of computer experience, and the majority have spent more than US $30,000 on their IS implementation projects. There is an equal distribution of hardware platforms across microcomputers, microcomputers with local area networks (LAN), and minicomputers in the sample. Most of the small businesses have implemented operational and management information systems applications such as accounting systems, inventory control, sales analysis, sales order processing, and payroll. Finally, all the small businesses have engaged external IS expertise to implement their information systems.

The effects of six other independent variables on the measures of IS effectiveness were examined. These variables were number of employees, annual sales, computer experience, computer expenditure, type of hardware and business sector. Table 3 shows that there is no evidence of significant correlations at the 10 percent level between IS effectiveness and the first four variables. The effects of type of hardware configuration and business sector on IS effectiveness were tested using one-way ANOVAs. Similarly, there is no evidence of significant relationships (all p-values greater than 10 percent level). In summary, these variables have no effect on the implementation results.

Table 2   Characteristics of Sample

	Frequency (n = 114)[a]
Sector	
Service	31
Commerce	25
Manufacturing	55
Number of Employees	
1–24	48
25–49	24
50–74	15
75–100	21
>100	5
Annual Sales (US$ Million)	
<$1.499	28
$1.5–$2.999	27
$3.0–$5.999	14
$6.0–$9.0	14
>$9.0	25
Computer Experience (years)	
0–1	18
2–3	34
4–5	22
6–10	32
>10	8
Computer Expenditure (US$'000)	
0–30	42
31–60	25
61–120	21
>120	26
Hardware	
Minicomputers and microcomputers	43
Microcomputers and LAN	34
Microcomputers only	33
Top 10 Software Application	
Accounts Receivable	96
General Ledger	90
Accounts Payable	87
Inventory Control	74
Sales Analysis	50
Sales Order Processing	47
Payroll	40
Purchasing	29
Budgeting	24
Job Costing	23

[a] Figures may not add up due to missing data.

4.   Data Analysis

Structural equation modeling is an approach to assess a model involving multiple constructs with multiple ob-

served items so as to simultaneously assess the structural component and the corresponding measurement component in an optimal fashion. Structural equation modeling is considered a powerful second generation multivariate analysis technique for studying causal models (Fornell 1982). In this paper, Figure 2 represents the structural model being examined. This model describes the relationships or paths among the constructs. Further, for each construct in the structural model, there is a related measurement model (not shown in the figure), which links each construct in the diagram with a set of manifest (or observed) variables. The manifest variables are typically the items on a questionnaire (see Table 1).

Structural equation modeling is superior to traditional regression and factor analysis because the measurement model is assessed within the context of the theoretical structural model (Fornell 1982). It addresses both models at the same time; compared to factor analysis which assesses the measurement model only and path analysis which addresses the structural model alone. Partial least squares (PLS) and LISREL are the most widely known implementation of structural equation modeling. PLS was developed by Wold (1982) while LISREL was developed by Joreskog and Sorbom (1981). In choosing between PLS and LISREL, some conditions need to be considered. LISREL demands some rather restrictive assumptions, including strong theoretical knowledge, multivariate normal distributions, interval scales, and fairly large sample sizes (Fornell and Bookstein 1982). PLS, on the other hand, has less restrictive assumptions. It does not depend on having multivariate normal distributions (distribution-free), interval scales, or large sample size. PLS is also consid-

Table 3   Pearson Correlations Between Sample Characteristics and IS Effectiveness

Variables	User Satisfaction	Organizational Impact	Overall IS Effectiveness
Number of Employees	−0.110	−0.101	0.078
Annual Sales	0.017	−0.083	−0.031
Computer Experience	−0.013	0.118	0 067
Computer Expenditure	0.039	−0.118	−0.006

* $p < 0.1$, ** $p < 0.05$; *** $p < 0.01$.

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ered more appropriate in earlier stages of theory development. PLS has been used successfully in marketing (Fornell and Bookstein 1982), organizational behaviour (Howell and Higgins 1990), and IS (Amoroso and Cheney 1991, Gopal et al. 1993, Igbaria 1993, Rivard and Huff 1988, Thompson et al. 1991).

Given the early stage of theory development in IS implementation in small businesses and the relatively small sample size, PLS was the preferred technique for data analysis in this study. PLS was used to assess the overall reliability and validity of the research model, and particularly to assess the variances explained in IS effectiveness by top management support and external IS expertise. Lohmoller's (1990) PLS program, LVPLS 1.9 was used to analyze the data.

4.1. Testing the Measurement Model

The measurement model consists of the relationships between the constructs and the items used to measure them. It involves examining the convergent and discriminant validity of the research instrument, which indicates the strength of the constructs used to test the research model. Three tests have been suggested for assessing convergent validity (Fornell and Larcker 1981). The first test is item reliability which is measured by the factor loading of the item on the construct. The second test of convergent validity is composite reliability of each construct. The third test is the average variance extracted by each construct. There is no generally accepted level of what constitutes an acceptable factor loading in PLS analysis. Fornell (1982) recommended a minimum loading of 0.70 which suggests that the item explains almost 50 percent of the variance in the construct; while Falk and Miller (1992) recommended a loading should be at least 0.55 which explains at least 30 percent of the variance in the construct. However, many IS researchers who used PLS analysis have used the 0.50 level (see Amoroso and Cheney 1991, Aubert et al. 1994, Igbaria 1993, Igbaria et al. 1994, Rivard and Huff 1988, Thompson et al. 1991). In addition, the factor loading should be statistically significant (Hair et al. 1992). Nunnally's (1978) guideline of 0.80 for assessing reliability coefficients was used to assess composite reliability. Fornell and Larcker's (1981) criterion that the average extracted variance should be 0.50 or more was used to assess the shared variance coefficients.

Table 4 presents the assessment of the measurement model. The results suggest that the convergent validity of the research variables is adequate. All the reliability coefficients exceeded 0.80 while the average extracted variances were 0.50 and above. In addition, Cronbach alpha of each construct was calculated. All the Cronbach alphas exceeded 0.80, suggesting that the constructs were reliable. The item-total correlation coefficients of user satisfaction (0.72 to 0.85), organizational impact (0.50 to 0.74), top management support (0.74 to 0.85), consultant effectiveness (0.68 to 0.80), and vendor support (0.73 to 0.84) were also high. An additional overall item was included in the questionnaires for each of the constructs. The overall item-aggregated construct correlation coefficients of user satisfaction (0.66), organizational impact (0.76), top management support (0.76), consultant effectiveness (0.75), and vendor support (0.77) were high indicating high reliability of the constructs. In conclusion, the constructs in the measurement model demonstrated more than adequate reliability.

Discriminant validity is the degree to which items differentiate between constructs, or measure different constructs. Discriminant validity can be assessed using two tests. The first test involves verifying that each item loads more highly on its associated construct than on any other construct (Thompson et al. 1991, Compeau 1992). The second test for discriminant validity is that each item should correlate more highly with other items of the same construct than with items of other constructs. To assess this, the squared correlation (shared variance) between two constructs should be less than the average variances extracted by the items measuring the constructs (Fornell and Larcker 1981, Grant 1989).

Table 5 presents the factor pattern matrix that shows the loadings of each item on all constructs. All the item loadings were greater than or equal to 0.55 and loaded more highly on their hypothesized constructs than on any other constructs. The relevant item loadings were also statistically significant at the 5 percent level. Hence, all items passed the first test for discriminant validity. Table 6 presents the results of the second test of discriminant validity. In all cases, the shared variance between two constructs was less than the average variances extracted by the items measuring the constructs. Hence, the requirement for the second test of discriminant

Table 4   Assessment of the Measurement Model in PLS

Construct	Mean	Standard Deviation	Range	Reliability Coefficient	Portion of Variance Extracted	Cronbach Alpha
Top Management Support				0.86	0.56	0 92
TopMgmt 1	4.85	1.68	1–7			0.75[a]
TopMgmt 2	4 88	1.50	1–7			0.80
TopMgmt 3	5.07	1 55	1–7			0.85
TopMgmt 4	5.59	1 41	1–7			0.74
TopMgmt 5	4 94	1 52	1–7			0 79
Consultant Effectiveness				0.89	0.67	0.88
Consult 1	5.03	1 17	2–7			0.72[a]
Consult 2	4.59	1.26	1–7			0.68
Consult 3	4.78	1.26	1–7			0.78
Consult 4	5.12	1 31	1–7			0.80
Vendor Support				0.85	0.50	0 93
Vendor 1	4.77	1.43	1–7			0.80[a]
Vendor 2	4 49	1.69	1–7			0.76
Vendor 3	4.67	1.50	1–7			0.80
Vendor 4	4.28	1.59	1–7			0.84
Vendor 5	4.27	1.57	1–7			0.83
Vendor 6	4.72	1 32	1–7			0.73
User Satisfaction				0.95	0.74	0.94
Satisf 1	5.59	1 10	1–7			0.72[a]
Satisf 2	5.73	1.10	1–7			0.79
Satisf 3	5 71	1.06	1–7			0.83
Satisf 4	5.63	1.13	1–7			0.82
Satisf 5	5.70	1.14	1–7			0.80
Satisf 6	5 77	1 13	1–7			0.80
Satisf 7	5.54	1 14	1–7			0.85
Organizational Impact				0.87	0.54	0.85
Orglmp 1	4.50	0.95	1–7			0.69[a]
Orglmp 2	4.48	0.92	1–7			0.74
Orglmp 3	5.32	1.03	2–7			0.56
Orglmp 4	4.96	0 99	2–7			0.72
Orglmp 5	4.21	1 18	1–7			0.50
Orglmp 6	5.16	0.84	1–7			0.54
Overall IS Effectiveness	5 02	1 19	1–7			

[a] Item-total correlation.

validity was satisfied, indicating that the measurement model discriminated adequately between the constructs.

4.2. Testing of Propositions

Following confirmation of good psychometric properties in the measurement model, we proceeded to examine the structural model. This evaluation consisted of an assessment of the explanatory power of the independent constructs, and an examination of the size and significance of the path coefficients. Jackknifing, a nonparametric technique, was recommended by Fornell and Barclay (1983) to produce parameter estimates, standard errors, and T-values. A 5 percent level of significance was used for all the statistical tests.

Figure 3 presents the results of the structural model. Thirty-one percent of the variance in user satisfaction, 10 percent of the variance in organizational impact, and 19 percent of the variance in overall IS effectiveness are

Table 5   Factor Pattern Matrix of Measurement Model in PLS

Measure	Construct					
	1	2	3	4	5	6
Top Management Support						
TopMgmt 1	**0.60**	0.13	0.09	0.17	0 10	0.17
TopMgmt 2	**0.55**	0.17	0 07	0 17	0.08	0.16
TopMgmt 3	**0.80**	0.20	0.18	0.20	0.20	0.18
TopMgmt 4	**0.93**	0.23	0 17	0.18	0.23	0.26
TopMgmt 5	**0.81**	0.18	0.23	0.16	0.16	0.25
Consultant Effectiveness						
Consult 1	0.17	**0.84**	0.36	0.37	0.13	0.27
Consult 2	0.14	**0.60**	0.41	0.23	0.18	0.19
Consult 3	0.20	**0.87**	0.49	0 38	0 18	0.26
Consult 4	0.23	**0.93**	0.51	0.41	0.17	0.28
Vendor Support						
Vendor 1	0.05	0.36	**0.56**	0.30	0.09	0.23
Vendor 2	0.04	0.37	**0.70**	0.37	0.20	0.24
Vendor 3	0.15	0.41	**0.71**	0 38	0.12	0.29
Vendor 4	0.14	0.53	**0.59**	0.30	0.12	0.24
Vendor 5	0 13	0.49	**0.68**	0 34	0 10	0.31
Vendor 6	0.24	0.55	**0.94**	0.49	0.24	0.34
User Satisfaction						
Satisf 1	0.16	0.35	0.37	**0.80**	0.45	0.32
Satisf 2	0 14	0 34	0.40	**0.84**	0.41	0.36
Satisf 3	0.20	0.43	0.49	**0.89**	0.46	0 28
Satisf 4	0 11	0.38	0.58	**0.87**	0.47	0.39
Satisf 5	0.19	0.37	0.35	**0.85**	0 46	0 37
Satisf 6	0 17	0.37	0.44	**0.86**	0.46	0.37
Satisf 7	0.22	0.40	0.43	**0.90**	0.52	0.28
Organizational Impact						
Organ 1	0.02	0.04	0.14	0.28	**0.67**	0 31
Organ 2	0.10	0.02	0.06	0.27	**0.75**	0.33
Organ 3	0.21	0 13	0.23	0.49	**0.80**	0.39
Organ 4	0.17	0.13	0.22	0.38	**0.82**	0.34
Organ 5	0.03	0.05	0.17	0.28	**0.58**	0.16
Organ 6	0.30	0.26	0.21	0.47	**0.76**	0.28
Overall IS Effectiveness	0.28	0.30	0.36	0.39	0.42	**1.00**

Note: Figures are factor loadings.

accounted for by the model. The percentages of variance explained are greater than or equal to 10 percent, implying a satisfactory and substantive model (Falk and Miller, 1992). The propositions can be evaluated based on the size, sign, and significance of the standardized path coefficients. All except one of the standardized path coefficients are significant at the 5 percent level of significance. This indicates that all the relationships hypothesized except for proposition 1a are supported by the PLS analysis. Vendor support is the construct most closely related to all three measures of IS effectiveness.

5.   Discussion

5.1.   Top Management Support *vs* External IS Expertise

The PLS results show that vendor support, a form of external IS expertise, is more closely related to user satisfaction, organizational impact, and overall IS effectiveness than top management support or even consultant effectiveness. This suggests that top management support is not the most important factor for small business IS implementation. It also lends credence to Senn's (1978) assertion that top management involvement, interaction, and support is a necessary but not sufficient factor for successful IS implementation.

Previous studies reported that when small businesses engage external IS expertise, top management tend to overestimate the impact of external IS expertise and underestimate the importance of their own involvement (Gable 1991, Lees 1987). The CEO, after approving the project, is not actively involved in the IS implementation and prefers to rely on the advice and recommendations of the external IS experts. Conventional wisdom suggests that this lack of top management support would lead to lower IS effectiveness. Our findings show that lack of top management support may be compensated by high external IS expertise. In a small business environment with a simple organizational structure and limited interpersonal and departmental politics, IS implementation is basically a technical matter (Thong et al. 1994). Sound technical knowledge of external IS experts can compensate for the lower top management support. While top management should be involved in key decisions affecting the business and business processes, they need not be actively involved throughout the implementation process. In fact, given the heavy demand on the CEO's time and attention, it is impractical to advise the CEO to devote a significant amount of attention to the IS implementation project in small businesses.

The above finding is also consistent with Attewell (1992) notion of "knowledge barriers." Attewell argued that service bureaus, consultants, and manufacturers

Table 6   Discriminant Validity

Construct	1	2	3	4	5	6
1. Top Management Support	0 560					
2. Consultant Effectiveness	0.053	0.670				
3. Vendor Support	0.047	0.254	0.500			
4. User Satisfaction	0 040	0.195	0.265	0.740		
5. Organizational Impact	0.058	0.029	0.066	0.287	0 540	
6 Overall IS Effectiveness	0.077	0.092	0.132	0.154	0.174	1.00

Note· Diagonals represent the average variance extracted; other entries represent the shared variances.

play important roles in lowering the knowledge barriers to technology diffusion, making it easier for businesses to adopt and use IT without extensive in-house expertise. In the case of small businesses, vendors and consultants perform the role of external institutions which aim to lower the knowledge barriers and make it easier for small businesses to adopt IS. Under such situations, it is important to engage vendors and consultants who are experienced, effective, reliable, understand the requirements of small businesses, and maintain good relationships with all concerned parties. It should be noted that even if the level of top management support was high, the IS implementation would likely result in failure if the external IS experts were ineffective in carrying out their respective functions.

5.2. Small *vs* Large Businesses

The analyses of the small business IS implementation environments suggest that the widely-held notion "top management support is vital for effective IS implementation" may not be universally valid. In fact, notwithstanding the level of top management support, it is the level of external IS expertise, specifically vendor support, that is likely to determine the level of user satisfaction, organizational impact, and overall IS effectiveness among small businesses. A possible explanation is that the types of issues faced by small businesses are different from large businesses.

In a study of 74 manufacturing businesses, DeLone (1981) found that small businesses tend to have less computer experience, more dependent on external software support, spend proportionately less of revenue on IS implementation, and spend most of IS budget on computer hardware than large businesses. He also

found that small businesses are more concerned with poor quality software and poor service from external vendors and consultants while large businesses complain of poor user understanding and complex systems. These differences may be due to resource poverty. Small businesses, whether in Singapore or other countries, suffer from this unique condition characterized by severe limitation on finance, limited internal availability of IS expertise, and a short-range management perspective (Welsh and White 1981). As a result, small businesses often need to rely on external IS expertise to assist in IS implementation. In comparison, large businesses do not experience resource poverty to the same extent as small businesses. Large businesses tend to have their own internal IS department and are not as

Figure 3   Assessment of Structural Model
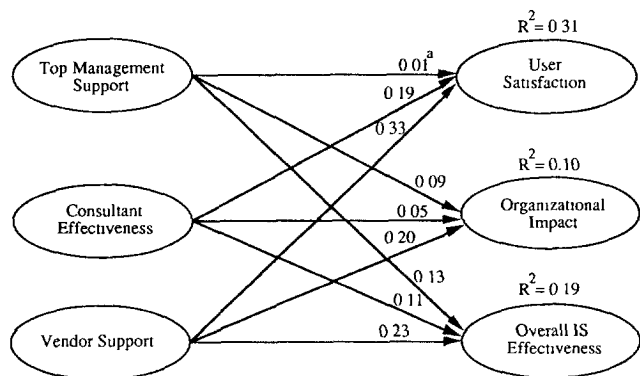
Note: [a] All *T*-values for the standardized path coefficients are significant at 0.05 or better except for this coefficient. *T*-values were calculated using Tukey's jackknifing method.

dependent on external IS expertise. For example, Turner (1982) found that larger banks tend to invest in internal IS expertise while smaller banks tend to depend on external IS expertise. Thus, small businesses face different issues and need to adopt different strategies from large businesses in order to manage their computer-related problems including availability of IS expertise. The results of this study provide further support that organizational theories and practices that are applicable to a large business may not be appropriate for a small business.

5.3. "Singaporeness"

As this study was carried out in Singapore, it is necessary to examine the business and IT environments of Singapore. It could very well be that for small businesses in Singapore, top management support is not very important but external IS expertise is, while the opposite may be true for small businesses in other countries. Thus, we need to discuss the issue of "Singaporeness," or what is special about Singapore.

Singapore is a newly industrializing country located at the southern tip of the Malay peninsula. As an integral part of its overall economic planning, Singapore has implemented a series of national IT plans and programmes to encourage diffusion of information technology in both public and private sectors (including small businesses) (Gurbaxani et al. 1990, Sisodia 1992). What differentiates Singapore from many other countries that also have major initiatives to promote IT is the comprehensiveness and coordination effort in implementing her IT plans (Wong 1992). The Singapore experience is a model of very pro-active government strategy. In 1980, the Singapore government appointed the Committee on National Computerization (CNC) under the chairmanship of a minister. A new government agency, the National Computer Board (NCB), was set up with the mission to move Singapore toward an information society. The NCB is responsible for effecting successful application of IT in the government, building an IT infrastructure, cultivating an IT culture, facilitating development of a strong export-oriented IT industry, and formulating IT human resource development policies and plans. In most of these objectives, the NCB has either achieved or surpassed its goals (Sisodia 1992).

Compared to businesses in other countries which started IS implementation much earlier, Singapore businesses lag behind in the use of IT. Hence, they have a lot of catching up to do. To remain competitive in the global market, these businesses realize that they need to computerize their operations in a short time. They cannot afford a long learning curve or a trial-and-error approach to IS implementation. These businesses are also small in size compared to Fortune 500 companies in the U.S.A. and lack in-house technical expertise. Under such an environment, they find it necessary to leverage their own efforts through the use of external vendors and consultants. In other words, the combination of resource poverty and a come-from-behind environment of IT use makes it especially important for businesses to rely on external expertise.

In general, relying on external expertise is more risky than in-house IS professionals because of the lack of control over these experts. However, this risk appears to be acceptable to Singaporean businesses as they tend to have lower uncertainty avoidance and lower individualism (Hofstede 1991, Raman and Watson 1994, Watson and Brancheau 1991). Singaporean businesses have lower uncertainty avoidance, i.e., the degree to which people prefer structured over unstructured situations. They tend to be less structured, have fewer rules, employ more generalists, and be multiform. As a result, their managers are more involved in strategy, more person-oriented, flexible in their style, and more willing to take risks. Also, in this environment, top management may rely on employees for the successful implementation of IS. This is a reasonable assumption for developing countries since most of the initial IS implementation can be categorized as transaction processing systems. Hence, the participation of CEOs in IS implementation would not be as critical. Singaporean employees are also less individualistic than those in the developed countries. Employees in low individualistic cultures expect their employers to look after them like a family member, and organizational procedures are based on loyalty and a sense of duty. Hence, the Singaporean business culture is different from that of developed countries like Australia, Great Britain, and United States.

In conclusion, contextual factors such as resource poverty, a come-from-behind environment of IT use,

and cultural differences, may explain the relative importance of external IS expertise over top management support in IS implementation in Singaporean small businesses. Hence, in making generalization from our research findings, one has to take into consideration these contextual factors. Our findings may not be universally true, but they are likely to be applicable to adoption of computer applications by small businesses in similar environments such as the other newly industrializing countries and developing countries.

5.4. Limitations and Directions for Future Research
This section describes the limitations of this research. As this study was conducted on small businesses in Singapore, the results may not be generalizable to businesses in countries with very differing institutional and cultural contexts. Further, the data is cross-sectional in nature. Future research could replicate this study in other environments and possibly use longitudinal design. Such studies can contribute to an understanding of the generalizability of the effect of external IS expertise.

Face validity is the perception of knowledgeable individuals regarding the quality of the measures. A content-valid instrument is difficult to create and perhaps even more difficult to verify because the universe of possible content is virtually infinite (Straub 1989). To tackle this, Cronbach (1971) recommended a review process whereby experts familiar with the content universe evaluate versions of the instrument repeatedly until a form of consensus is reached. The measures used in this study were developed through an extensive literature review followed by iterative reviews by both practitioners and experienced IS researchers. Further, the research variables have been used in prior studies and found to demonstrate adequate reliability and content validity. The questionnaires were also pilot-tested in the field. Notwithstanding this, future researchers can supplement the measure of top management support with additional items to capture other notions of top management support in small businesses.

On hindsight, we should have asked the computer user-managers to evaluate the organizational impact and overall IS effectiveness. However, as user satisfaction of the computer user-managers is correlated with both measures of IS effectiveness, we feel that the po-

tential for project manager bias is minimal. Nevertheless, multiple response is to be encouraged. Further, in order to capture other dimensions of IS effectiveness, other measures (e.g. system usage) could be included in place of an overall measure of IS effectiveness.

6. Conclusion
The importance of top management support in IS implementation as expounded in previous studies needs to be qualified. Although top management support plays an important role in influencing IS effectiveness, it is not as important as external IS expertise, especially vendor support, in the small business environment characterized by resource poverty, low uncertainty avoidance, less individualistic culture, and a come-from-behind use of IT. While top management may provide the resources needed for the project, ultimately it is the external IS experts in the forms of vendors and consultants who implement the systems. The implication for small business management is that to achieve a high level of implementation effectiveness, they should direct more efforts at selecting and engaging high quality external vendors and consultants. The implication for research is to identify attributes of "good" or "effective" vendors and consultants, and develop effective approaches for engaging them.[3]

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