“DSS utilization: A comparative study for major firms in Germany and the USA: An examination of the Implementation Paradox”

AUTHORS	Edward J. Lusk Moncef Belhadjali Michael Halperin Dirk Matzner

ARTICLE INFO	Edward J. Lusk, Moncef Belhadjali, Michael Halperin and Dirk Matzner (2005). DSS utilization: A comparative study for major firms in Germany and the USA: An examination of the Implementation Paradox. *Problems and Perspectives in Management*, *3*(2)
RELEASED ON	Tuesday, 17 May 2005
JOURNAL	"Problems and Perspectives in Management"
FOUNDER	LLC “Consulting Publishing Company “Business Perspectives”

NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
0	0	0

© The author(s) 2026. This publication is an open access article.

BUSINESS PERSPECTIVES

businessperspectives.org

DSS utilization: A comparative study for major firms in Germany and the USA: An examination of the Implementation Paradox[1]

Edward J. Lusk, Moncef Belhadjali, Michael Halperin, Dirk Matzner

Abstract

Although there is general agreement that the management demands of the Singerian milieu require decision support systems (DSS) to efficient by and effectively employ the organization's scare resources, some suggest that there has been a paradoxical DSS utilization gap. We collected information from a sample of the Fortune 500 and of the top 150 organizations in Germany to examine: (1) the extent of DSS components utilization in the U.S. and Germany, (2) decision maker ratings of their DSS, (3) differences between the two countries, and (4) overall DSS utilization. We found, contrary to the implementation paradox, extensive implementation of the major DSS components and further that they are highly valued. We found SAP™ more highly utilized in Germany that may explain some DSS utilization differences between Germany and the U.S.

Key words: Decision Support Systems, DSS Implementation Paradox, Survey Results.

Introduction

As Bhatt and Zaveri (2002) demonstrate, the world of organizational decision-making has certainly changed in character since the introduction of the Internet. Designing the EDT linkages to realize the expert systems, knowledge management and AI potential of the B2C, B2B, B2P, and B2E, channels is one of the management challenges of the Internet age. Managing in this dynamic context requires organizations to develop the IS protocols that convert the relatively constant flow of data from the Internet, ExtraNets, and IntraNets into cogent planning and control information. While it is unarguable that the Internet has changed the character of the decision-making process, the decision imperatives have not changed. The fundamentals still govern: create an organizational trajectory that improves profitability; manages market share; and additionally, for public companies, improves the market value of the firm, insures that EPS beats street projections, and improves Balanced Scorecard performance. As Setzekorn et al. (2002) note:

Decision making support systems are especially strategic in today's complex business environment where heightened global competition pushes firms to diversify their product offerings into product markets with which they have little experience, and at the same time, to compete on cost, quality, reliability and responsiveness dimensions. Managing the complexity inherent in optimizing multiple product lines on multiple performance dimensions across multiple organizations in the supply chain has heightened the need for competence and timeliness in decision-making.

Setzekorn et al. continue that despite the obvious need, and the availability of DSS component development, there has been a lack of implementation. They refer to this as an "implementation gap," and suggest that the lack of DSS adoption is due to difficulties in implementation. Indeed, when one considers the formidable implementation issues of developing the needed management interfaces and constant legacy pressure experienced by organizations which now exist in, as Courtney (2001) notes, a Singerian world, it may be the case that trying to create and manage relevant DSS interfaces creates the following paradoxical situation: DSS are needed in the dynamic e-world, but given the pressure of working in this environment without adequate DSS, there is rarely time to develop such DSS. This dilemma was first suggested by Chi and Turban (1995) almost ten years ago, and the recent evidence also suggests that for many organizations the challenges and costs of design, implementation and management of DSS remain impediments to their wide spread utilization. See also Guimaraes et al. (1992), Santhanam et al. (2000), and Wheeler and Jones (2003).

[1] We wish to thank the Department of Statistics of the Wharton School of the University of Pennsylvania for their Assistance in the sampling of the Fortune 500 firms.

We were interested in examining the extent to which this implementation gap exists for organizations that should be able to create and maintain effective DSS. Further, we were interested in examining country differences regarding the use and evaluation of DSS. To this end, we selected organizations in Germany and the U.S. that one would assume to have the resources sufficient to develop a DSS environment. If these organizations have not implemented DSS, it probably is an indication that "the DSS light is not worth the candle." However, on the other hand, if the major commercial players are employing DSS, this may rationalize the commitment of time and resources for other firms in the economic market-place to consider creating DSS environments.

The Study

This study reports the results of a questionnaire that was distributed to a random sample of the Fortune 500 and of the top 150 German corporations ranked by net sales. The questionnaire posed questions of utilization and evaluation for the following 6 components of the DSS environment:

Executive Information Systems (**EIS)** is a computerized system specifically designed to support executive work.

Group Decision Systems (**GSS)** are information systems that support the work of groups (communication, decision making) generally working on unstructured and semi-structured problems.

Materials Resource Planning (**MRP)** is a computerized integration plan for purchasing and/or buying parts and subassemblies used for several items so that inventories are minimized but product deliveries are met on schedule.

Knowledge Management Systems (**KMS)** is a system that facilitates knowledge management by ensuring knowledge flow from the person(s) who know(s) to the person(s) who need(s) to know throughout the organization.

Supply Chain Management (**SCM)** treats all of the activities involved in managing supply chains: planning, organizing, staffing, and control.

Enterprise Resource Planning (**ERP)** is a process that integrates the information processing of all routing activities inside an organization (e.g., ordering, billing, production scheduling, budgeting and staffing) and among business partners.

Additional Questionnaire Information

To assist the respondents, we provided the brief definition, noted above after the abbreviation, for each of the above 6 components. These definitions were taken verbatim from Turban and Aronson (2001). In addition, we included the following as the lead-in to the questionnaire:

DSS refers to the integration and use of computer-aided models to produce information that is used by decision-makers in planning and control of the organization's resources. More information can be found about DSS, and on many of the terms used in this questionnaire, on the following Website: www.prenhall.com/turban.

We further asked the respondents to rate the effectiveness of these particular DSS components. For example, consider the question posed for MRP:

Do you have a **M**aterials **R**esource **P**lanning system?

(MRP is a computerized integration plan for purchasing and/or buying parts and subassemblies used for several items so that inventories are minimized but product deliveries are met on schedule.)

( ) Yes

( ) No

If Yes, using the following scale —Where you may select any number from 1 to 10, how would you rate the MRP system that you are using?

Very valuable Sometimes useful Really, a waste of time
10----------5----------1

Besides these 6 components, we included questions dealing with:

Priory Setting Models (**PSM)** such as Expert Choice™. Although this decision making tool is not listed specifically by Turban and Aronson as DSS, we feel that in the current dynamic environment, priority setting models may play a role in the decision milieu, and **SAP**™, because it has some features of many of the individual components of the six DSS components drawn from Turban and Aronson. In fact, they define SAP™ as an ERP system, an assessment that we support.

We also asked for "open-ended comments"; and finally, to give a context for the study, we collected basic information about the responding organization's Web presence; the level of sales in the e-commerce channel and the access that they permit to clients/customers and partners in the e-chain.

The Questionnaire Development

We pilot-tested the questionnaire on individuals in the English Language Division of the Masters Program of the Otto-von-Guericke (OVG) University, Mageburg Germany who had at least three years of organization experience. Another test reader was Dr. George Litwin, an expert in the field of organizational design. (Litwin et al., 1996). We then had the English version of the questionnaire translated into German by a native speaker who was a student in the OVG program. This translation was subsequently evaluated and refined by one of the authors who also was a German native speaker and who lived and studied in the U.S. while completing a Masters Degree in Engineering (Both the English and German versions are available from the correspondence author).

Distribution

We sent the English version of the questionnaire to a random sample, n =169, of the CFOs of the Fortune 500 firms who were on record as of June 2002. The Fortune 500 download from the Thomson Research SEC database, contains the CFO exact title and name as well as the mailing address of the organization. The German version was sent to the CFOs of a random sample, n = 139, of the top 150 firms ranked by sales for 2001. For the German sample, we collected this CFO information from the firms' Websites because it was not noted on the listing downloaded from the Thomson Research Worldscope database. When the CFO was not noted on the Website, we collected that information from the organization through their Website e-mail contact. Finally, the remaining questionnaires were addressed to the CFO as an organizational title,12 were so sent. For the U.S. sample, 5 were returned due to the fact that the CFO was no longer a member of the organization; 3 were returned owing to the policy of the organization to not participate in surveys and one was returned undelivered. We received 33 completed questionnaires giving a U.S. response rate of 20,6%. For the German sample, 2 questionnaires were returned undelivered and 5 were returned because of the non-participation policy. We received 31 questionnaires for a German response rate of 23,5%.

The Analysis

There are 4 principle questions addressed by the study: (1) To what extent are the individual DSS components utilized by the major organizations in the U.S. and in Germany? (2) How do the decision makers rate their DSS? (3) Are there any differences between the two countries? and (4) How extensive is overall DSS utilization? To provide a context for the analysis, we will first consider the e-profile of the responding organizations.

The Web Presence

Each organization had a Website. Overall, about half of the responding organizations had B2C links. The level of sales for both the German and U.S. firms offering products in the e-channel was about 5% of their total gross sales. 70% of the firms permit customers and e-partners access to organizational information. This access, which is largely order information and stock availability, is almost exclusively controlled by passwords and explicit verification of customer identity information. There were no statistically significant differences $p < 0,1$ between the above noted profiles for the two countries. This information gives the Web-profile of the German and US firms: They are for the most part similar and both countries are actively engaged in the usual Internet possibilities.

The PSM, the 6 DSS components and SAP™

In the analysis, we will be testing the response average against the mid-point of the scale – 5 which is noted as "Sometimes useful". Also, we will be looking at the relationship between the 2 countries in terms of the decision-maker evaluation of the DSS components.

Regarding the priority-setting models (PSM), about 25% of the US respondents utilized some sort of formal priority-setting modeling system compared to less than 5% of the German respondents, p = 0.03. All proportional differences were tested by using the two-tailed Fisher's Exact Test. The evaluation of these PSM on the Usefulness scale was 5,9, which did not test different than 5,0, suggesting that these models were only sometimes useful in the particular decision-making context.

The remaining 6 components are reported in Table 1 where the percentage of utilization and the usefulness scores can simply be presented along with their statistical significance as indicated by the two-tailed p-value.

Table 1

Country DSS Utilization and Evaluation

	Percentage Utilization			Scoring of Usefulness		
	Germany	U.S.	p-value	Germany	U.S.	p-value
EIS	90	80	0,32	7,7	7,1	0,22
GSS	30	40	0,45	6,9	7,4	0,32
KMS	33	60	0,05	7,7	7,6	0,88
MRP	57	86	0,01	8,7	7,5	0,003
ERP	67	71	0,79	8,5	7,4	0.012
SCM	30	69	0,003	8,5	7,4	0,36

Regarding the utilization of SAP™, as expected, the German firms are more invested in SAP™ than the US firms are 87% to 63%, $p < 0,05$. Also the German respondents scored SAP™ as more useful than the U.S. respondents did, 8,2 to 7,2 $p < 0,02$.

Discussion and Conclusion

As one can observe from Table 1, the KMS, MRP and SCM components are more frequently used in U.S. firms than in German ones. This is probably the result of the heavier use of SAP™ by German firms compared to those in the US. Many of the features of SAP™ can provide much the same information as the DSS systems used in the US. One of our respondents, Peter Warnecke, Board Member, Support Finance and Controlling of Deutsche Telekom, made this suggestion:

> *"SAP™, due to its integrated nature, can routinely provide the same decision information as DSS that are intended to be used in managing the supply chain which directly relates to the materials management for the organization" (BSC Lecture – OVG June 2003); also see Santhanam et al. (2000).*

Secondly, the usefulness ratings for the 6 DSS components for respondents of both countries test above the "Sometimes" useful midpoint of the rating scale, $p < 0,05$. This suggests that overall, the respondents felt that their DSS were providing relatively highly relevant and useful information, given their decision requirements.

Thirdly, the usefulness ratings of DSS are similar between the 2 countries, with 2 exceptions. German respondents rated their DSS experience with ERP and MRP components as more useful than the U.S. respondents did. We found that fewer German firms use MRP. This is consistent with the SAP™ trade-off. But those who do use MRP seem highly satisfied with the information it provides. There is no difference in the use of ERP, but here again the German respondents

have rated it as more useful than the US respondents did. The DSS components that scored the highest in both utilization and usefulness (a combined score) were, in high/low ranked order: EIS, MRP and ERP. This suggests that the flow of decision information addresses both the planning/strategic and production/tactical dimensions that one associates with well-managed organizations, in which planning is a trajectory concept combined with the efficiency aspects of resource employment.

The least-utilized DSS was the GSS. This seems a bit out of step with the connected Singerian world of the Internet. One would suppose that group decision-making, now relatively simple in the virtual world, would be a central part of the decision-making environment. Perhaps this says something about the utility of the group process in a dynamic world where timeliness is one of the major features. The relatively low utilization of GSS may indicate that the DSS configurations have enabled individual decision-makers to "replicate" the group process, and that face-to-face and virtual meetings are no longer needed to facilitate the decisions needed to manage the organization. This conjecture rests as a possibility for further investigation.

Finally, the overall extent of employment of DSS is basically the same between the German and U.S. firms, with 89% of the German firms and 91% of the U.S. ones employing 3 or more of the above DSS, including SAP™, as a regular part of their decision systems. This is a different result than one would expect from the research of Setzekorn et al. (2002), who suggest that the DSS have not been extensively implemented. Our survey finds that the DSS are extensively employed, probably because they are needed in today's decision-making world and contribute overall to organizational efficiency.

In conclusion, apparently, the major German and U.S. organizations have responded to the challenges posed by the Singerian world in that they have extensively employed and highly valued their DSS. There are some country DSS utilization differences that may relate to the more extensive utilization of SAP™ in Germany than in the U.S. One possible area of DSS refinement may be the use of priority-setting modeling systems in both Germany and the U.S., because they are neither extensively utilized nor valued to the same extent as the major DSS components. Finally, the overall results seem to be consistent with the "form follows function" idea. In the DSS case, "value promotes use." These results offer general encouragement that DSS are not merely frills, but are needed in the dynamic world market place where decision-intel is often an important variable in determining success.

References

1. Bhatt, G.D. and Zaveri, J. The enabling role of decision support systems in organizational learning// Decision Support Systems, 2002, Vol. 32, pp. 297-309.
2. Chi, R J. and Turban, E. Distributed intelligent executive information systems// Decision Support Systems, 1995, Vol. 14, pp. 117-130.
3. Courtney, J. F. Decision making and knowledge management in inquiring organizations: toward a new decision making paradigm for DSS// Decision Support Systems, 2001, Vol. 31, pp.17-38.
4. Guimaraes, T., M.Igbaria, T., and Lu, M. The determinants of DSS success: An integrated model// Decision Sciences, 1992, Vol. 23, pp. 409-430.
5. Litwin, G., Bray, J., and Brooke-Lusk, K. Mobilizing the Organization: Bringing Strategy to Life, Prentice Hall London, 1996.
6. Santhanam, R., Guimaraes, T, and George, J. F. An empirical investigation of ODSS impact on individuals and organizations// Decision Support Systems, 2000, Vol. 30, pp. 51-72.
7. Setzekorn, K., Sugumaran, V., and Patnayakuni, N. A comparison of implementation resistance factors for DMSS versus other information systems// Information Resources Management Journal, 2002, Vol. 15, pp. 48-63.
8. Turban, E. and Aronson, J. Decision Support Systems and Intelligent systems, 6th Edition, Prentice Hall , 2001.
9. Wheeler, P. and Jones, D. The effects of exclusive user choice of decision aid features on decision-making// Journal of Information Systems, 2003, Vol. 1, pp. 63-83.