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Evaluation of information management systems using DEMATEL method

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Abstract

Typewriters, carbon paper, filing cabinets, and the postal service were the main information processing building elements for yesterday's organizations. Because of the limitations of these primitive information processing technologies, businesses frequently had to consolidate their workforces under one roof and establish effective but reasonably stable management hierarchies. These outdated organizational patterns survived in spite of significant advancements in information processing technologies. Successful enterprises of the future will be built on the foundation of modern communications and computing technology. The capacity of these organizations to link and unlink knowledge node networks will determine their success. Is Information Management (IM) a New Label for Knowledge Management (KM) or a Growing Field? The study provides empirical data of how KM has been applied in various types of organizations to offer some solutions to this topic. The report offers a taxonomy of the techniques utilized and is essentially an exploratory research on the practices of KM. In order to highlight possible distinctions between KM and IM, many organizations describe what makes KM special. The article's first section covers ideas linked to knowledge and information management. The study under discussion contrasts and compares the results of recent IS management studies conducted in Singapore, Australia, Europe, and the United Nations. It looks at the main issues facing IS managers in various areas, highlighting and elaborating on regional parallels and variances. On the most crucial difficulties they encounter, IS administrators in Australia, Europe, and the US exhibit a reasonable amount of consensus. They regard their business operations in the medium to long term, and planning and relationships with external management are very important to them. There are several justifications given for Singaporean managers to realise and comprehend that their issues are unique. The regional variances in the IS function can be managed more skillfully by IS managers in global corporations. IS managers must, at the very least understand the numerous internal views of the international economy. This article offers a fresh method for creating new information management contracts and strengthening the infrastructure of all information systems. The paper covers how to apply lean thinking to information management specifically; the organization, visualization, and representation of information can be thought of as adding value to it. Information management also enables the flow of information (value) to the end user (customer) through cooperation, sharing, and exchange. Lean thinking's potential advantages are addressed, and the main obstacles standing in the way of its application to information management are identified. Among them are developing five principles and identifying the type of waste; In the context of value, value streams, flow, pull, and information management, ongoing improvement The primary contributions of this study are the conceptual framework for a set of lean principles in the context of information management and the development of an understanding of these crucial components. We see information management skills playing an important role in developing other organizational skills for customer management, process management and performance management. In turn, these capabilities positively influence organizational performance measures of customer, financial, human resources, and firm performance. Among the key management implications, senior leaders should focus on creating the necessary conditions to improve IT infrastructure and information management capabilities, as they play a fundamental role in building other capabilities for improved organizational performance.

Keywords: Strategy of the Network Organization, Five Types of Theory in Information Systems, Decision Making Trial and Evaluation Laboratory.

Introduction

Information technology, according to Management magazine, is at the heart of a profound shift of organizational life. Moving toward a dynamic network form has been briefly used to define successful businesses. Businesses like General Motors, IBM, Siemens, and Sears made use of their prior achievements to concentrate on long-term strategic goals that were chosen by a limited number of senior executives as intermediate steps. Currently, these businesses are being outdone by chameleon-like agile businesses that may shift their strategies in response to opportunities presented by interactions with clients or by unforeseen changes in their unstable environments. These new organizations' boundaries and nervous systems are defined by cutting-edge information and communication technologies. The struggle for customers' winners and losers "will be defined by minute variations in how corporations acquire, disseminate, store, analyse, and act on information". Because of the ambiguity surrounding the terms knowledge and information, it is difficult to distinguish between knowledge

management (KM) and information management (IM) in the KM literature. Since most terminology and techniques, including knowledge mapping, appear to have been adapted from IM and bibliographies, there is no agreement that KM is a distinct area with its own scientific foundation. Some people view KM as the "Emperor's New Clothes," while others view it as the "business salvation." KM is a field that is, on the one hand, expanding. As a result, the author of the first book, Knowledge Management Foundations, which was published in 1993, is credited with coining this phrase. However, some assert that organisations and information KM-related activities have been used by professionals for many years. This study analyses and compares the results of previous investigations conducted in Singapore, Australia, Europe, and the United States of America (USA). The goal is to take a complete look at the main worries that international IS managers have and to distinguish between those that are global and those that are regional in scope. IT managers may effectively manage their increasingly international operations by having a thorough understanding of regional similarities and variances. IT managers who only have regional or national responsibilities might learn why certain challenges are significant just in their area of responsibility. This article examines the creation of a waste model and fundamental principles for lean information management in order to create an understanding and theoretical foundation for using lean thinking in the context of information management. The paper initially covers methods for enhancing information management and emphasises the necessity of essential strategies that support an information management system's overall progress. The lean idea is then introduced, along with its history, development, and use in processes other than traditional manufacturing. The fundamental nature of waste in the setting of information management is then described and related to important challenges for information management in small and medium-sized businesses. In respect to the conventional lean concept and procedures, a discussion of waste is presented the principles of lean information management and manufacturing. Of course, information technology is crucial to information management. However, we contend that businesses should place greater emphasis on managing soft knowledge, such as tacit knowledge, judgement, and intuitive abilities, in order to accomplish effective information management. The necessity for or acceptability of an enterprise-wide approach to information management has increased with the advent of modern information and communication technology. Therefore, efforts to establish technology-based management information systems can only support efficient information processing if they are coupled with sensible organisational tactics.

Strategy of the Network Organization

Network organisation approach is founded on the ideals of flexibility and client response. The network system is concentrated on offering levels of personalisation and modification to meet the distinct and erratic needs of clients. To the extent possible, however, maximal flexibility and customisation come at the expense of standardised, mass-produced goods and services. The network organisation employs a mass customisation strategy, which combines low cost differentiation tactics. According to the term's original user, mass customization means "doing so in the arrangement of individual clients and on a mass level." A company that is pursuing a mass customisation approach divides its expertise, services, and goods into the smallest reproducible parts (such as modules) and then focuses on combining and matching them to satisfy different customer needs. The usage of identical units repeatedly results in economies of scale. Being responsive means customising products to match the demands of individual customers. The customer contact person or team will frequently initiate the matching process directly, or the client may escalate it. Replicated knowledge and service units with mass-produced product components need to be controlled globally in a networked system. Expertise and information must be organised into repeatable pieces and kept in easily available electronic libraries that can be accessed from anywhere in the world. In this example, Cinco Colors offers previously published works for adaptation and reuse. With the help of a global resource team of business experts and reusable multimedia training modules, the specialised talent for Empire Software's education programme is recognised (not improved). An existing presentation template is coupled to a bespoke marketing pitch for Empire. The quantity and complexity of client information collected increase as a result of mass customization. This quickens the rate at which data from multiple sources needs to be combined and distributed across the problem-solving web. The role of the client in the manufacturing process is likewise altered by personalization. The customer's position in the manufacturing or service process is likewise altered by mass customisation. Customers were traditionally seen as an uninvolved source of demand in manufacturing-based economies, but customization might necessitate online client interaction from the moment an order is anticipated until the moment it is specified. Delivery, follow-up care, and service activities for effectiveness. For instance, Tara Rodgers was able to qualify as a supplier at a prior position because she had access to Cinco's database. In order to prepare for the presentation, Rodgers transmits resources from his own database as well as those of Empire and Templeton (such as the corporate logos of Global and Empire as well as the names, positions, and pictures of possible experts and Templeton academics). The amount and complexity of information that must be shared between the customer and provider is significantly increased by the customer's involvement in the service's design, production, and delivery. Furthermore, it is challenging to anticipate these needs. More dynamic organisational structures and information systems that can combine information at the proper level to solve a particular customer problem are therefore required. In a network environment, structural challenges take precedence over strategic ones.

Five Types of Theory in Information Systems

Following are samples and a thorough description of each sort of theory. Each type of theory has some unique characteristics, and the many types of work vary depending on the theory's intended use and the work's primary focus. The

seven theory components—representational mechanisms, structures, linkages, purpose, causal explanations, falsifiable claims, and prescriptive statements—that were originally defined are all examined in the examples presented for each theory type. Since the theories behind these seven components are rarely directly stated and some interpretive leeway is employed to provide instances, this study of the extant literature is not simple. Furthermore, classification is based on the key or principal goals of the theory rather than the lesser ones, as was already established.

Type I: Theory for Analyzing

Analytic theories focus on "what" rather than on establishing causality or offering predictions. These are the most fundamental theories. By synthesising commonalities discovered in individual observations, they describe or characterise specific dimensions or features of individuals, groups, situations, or events. They talk about "what." When the phenomenon is unknown or poorly understood, explanatory theories are required. In IS, there are numerous taxonomies, classification systems, and frameworks. The framework for management information systems is a prime example of an early scenario. The definition of constructs and study on the metrics that go along with them are further examples of theory in this category. For instance, Davies' definition and measurement of ease of use and usefulness allowed us to examine and quantify these notions' defining qualities. Some instances of grounded theory may also be instances of Type I theory, in which the categories of interest are explained using the grounded theory methodology. The subtype of theory will determine how much more analysis is needed. The classification scheme's evaluation standards have already been mentioned. If a classification system is created, the hierarchy of classification should be acceptable, category names and groups should make sense, and the system should be usable for analysis (the most important categories are shown at the highest level.) It should be apparent why cases are divided into different groups as well as what defines each category. The classification system should also be complete and include all major sorts of elements, otherwise it will not be complete. Previous categorization schemes may be changed if new items are discovered, or a preferred method of classifying or naming categories may be adopted. We can assess a theory's contribution to knowledge by making decisions about how well it satisfies these criteria.

Type II: Theory for Explaining

This kind of theory mainly explains why specific things happen. Making testable future predictions, however, is not the main focus of these theories because of how they are constructed. Process type theory is the result of explanations of how, when, where, and why events occurred. This group of ideas can be referred to as theories of understanding because they frequently place an emphasis on demonstrating to others how to view the world in order to influence how or why things are. Once more, we demand the veracity and accuracy of any descriptions of actual events as well as support for generalisations. Since the goal of this kind of theory is to explain how and why things happened, we anticipate that any justification will be presented with great care. Finding a cause faces the same challenges as any other research strategy. It is necessary to analyse and assess potential alternative causal explanations for how a specific effect might have occurred (internal validity). The dependability, validity, consistency, and transferability of the arguments, as well as the provision of new or fascinating insights, are the main criteria used to evaluate this type of theory's contribution to knowledge.

Type III: Theory for Predicting

Prediction theories predict what will happen but do not explain why; some system components are "black boxes." Without going into great detail about the underlying causal linkages between the dependent and independent variables, these theories can forecast results from a set of explanatory factors. There are numerous causes for why a component of a computer turns into a black box. First, because prediction is the theorist's main area of interest, a full explanation of the underlying supporting mechanisms may not be essential. Instead, the theoretical model may concentrate on prediction. Some economists acknowledge that as long as their theories are highly predictive, they don't care if the underlying assumptions are unreasonable. Second, the justifications for causality in conventional relationships are still unknown. Captain Cook, who was unaware of the precise reason, believed that regular ingestion of citrus fruits had a positive practical effect in preventing scurvy. Others will eschew theory in favour of empirical generalisations or rules of experience. Third, a spin on this type of theory is that it shouldn't contain causal claims, according to the logical positivist perspective. Furthermore, if we comprehend the connection between two variables, we can enhance our methods. Using a proxy like organ size can produce uneven outcomes even if it has a high level of predictive potential in many instances. We are interested in manipulating variables from a practical standpoint, so we must understand the causal linkages between the variables. Organizational resources, which are the "actual" requirements for innovation, are less likely to be manipulated than organisational size.

Type IV: Theory for Explaining and Predicting (EP Theory)

According to generally used theories in both the natural and social sciences, this form of theory explains what, how, why, when, and what will be (although Type III theory is considered by others to be a natural-science type model). Without using nomenclature like "scientific type" theory, which is not matched by divergent perspectives on the philosophy of science, it is difficult to identify a suitable restricted label for this type of theory. Consequently, we shall refer to this course as EP theory. In addition to describing theoretical structures and their connections, EP theory also focuses on understanding underlying causes and prediction. Case studies, surveys, archival studies, experiments, grounded theory methodologies, quasi-experiments, statistical analysis, and field investigations are just a few of the research techniques that can be utilised to investigate various facets of the EP theory genre. This type of theory can benefit from both process studies, which investigate phenomena as they develop over time, and variation studies, which forecast changes in one variable over another, despite language issues that have already been mentioned. It is acceptable to have a general dynamic theory through this form of theory (with feedback loops similar to general systems theory), but cross-sectional (differential) research should be used to

test the theory's assumptions. Studies are helpful when developing or evaluating theories. There are several possible criteria for a "good theory," including clarity, discrimination, elegance, internal consistency, agreement with evidence, lack of confirmability, and arbitrariness. Several authors explain how "scientific" knowledge should be created and assessed. Argument, external and internal validity, and other theories' consistency.

Type V: Theory for Design and Action

This kind of thinking instructs us on how to carry out a task. It concerns the guiding principles, procedures, and reasonable theoretical understanding of form and function utilised in the creation of IS. Through work that has built a framework to demonstrate actions and results, design science IS validates the link between design and natural science research. The constructions, models, techniques, and implementations are the four end results of design science. These ideas are further developed where the artefact itself is emphasised as the primary or only contribution of design science, despite the contributions of design science including foundational constructs, models and methods, and an assessment of the design science knowledge base. However, these authors saw the term theory as a defence of the natural sciences, likewise measures. However, rather than attempting to define a specific design-type theory, this study focuses on design as an activity. What does a theory of this kind add to our understanding? Mention a few of the circumstances in which you agree with them that design has advanced science. Usefulness to the user base, uniqueness of the artifact, and the veracity of its health claims are some of its criteria. Models and procedures can be judged based on their thoroughness, consistency, brevity, usability, and the calibre of the outcomes they produce. For Simon, the word "interesting" is the ideal descriptor.

Decision Making Trial and Evaluation Laboratory (DEMATEL)

A complete framework for creating and analysing structural models that take into account causal interactions between intricate components is called DEMATEL. The Experimental and Evaluation Laboratory Method for Decision Making was used between 1972 by the Science and Human Affairs Program and 1976 by the Battle Memorial Institute in Geneva to analyse and resolve complex and interconnected problem groups. The DEMATEL methodology contributes to the hierarchical identification of practical solutions while improving comprehension of a network of interconnected challenges. You can better comprehend the components and their relationships by looking at the overall interaction matrix. Due to its possibilities, DEMATEL has various shortcomings. To address these issues and broaden the range of applications, various improved solutions have been put forth. In order for DEMATEL to generate a non-null answer for the first issue, where the initial direct-relation (IDR) matrix may occasionally fail to converge to zero to the first infinite power, a non-Archimedean infinity is introduced. the answer to the issue. By easing cognitive judgement in the face of various influencing circumstances, the current study intends to produce DEMATEL. Third, the DEMATEL extension shows that MCDM decision-making issues may be more difficult than straightforward. Hierarchical Organization The hierarchical decomposition of the current work can be theoretically supported by prior research. The goal of the current project is to expand DEMATEL so that it may be used in complicated systems.

TABLE 1. Data Set

	Power distance	Uncertainty avoidance	Individualism	Masculinity	Sum
Power distance	0	5	7	3	15
Uncertainty avoidance	4	0	3	9	16
Individualism	3	7	0	2	12
Masculinity	8	4	6	0	18

TABLE 1 shows that DEMATEL in Power distance, Uncertainty avoidance, Individualism, Masculinity, Sum of all parameters given in high value. 18 is the highest value.

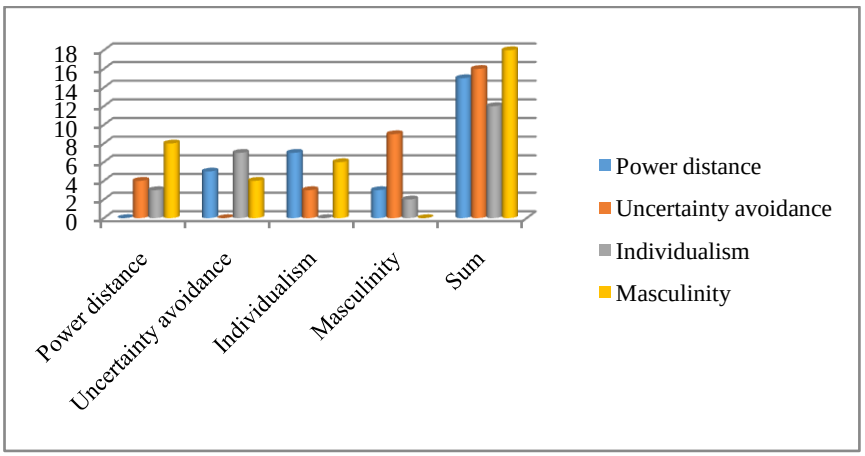

Figure 1 shows that DEMATEL in Power distance, Uncertainty avoidance, Individualism, Masculinity. Sum of all parameters given in high value,18 is the highest value.

TABLE 2. Normalisation of direct relation matrix

Normalisation of direct relation matrix				
	Power distance	Uncertainty avoidance	Individualism	Masculinity
Power distance	0	0.277778	0.388888889	0.1666667
Uncertainty avoidance	0.222222222	0	0.166666667	0.5
Individualism	0.166666667	0.388889	0	0.1111111
Masculinity	0.444444444	0.222222	0.333333333	0

Table 2 shows the Normalizing of direct relation matrix in Power distance, Uncertainty avoidance, Individualism, Masculinity. The diagonal value of all the data sets is zero.

TABLE 3. Calculate the total relation matrix

Calculate the total relation matrix				
	Power distance	Uncertainty avoidance	Individualism	Masculinity
Power distance	0	0.277778	0.388888889	0.166666667
Uncertainty avoidance	0.222222222	0	0.166666667	0.5
Individualism	0.166666667	0.388889	0	0.111111111
Masculinity	0.444444444	0.222222	0.333333333	0

Table 3 shows that they calculate the total relation matrix in Power distance, Uncertainty avoidance, Individualism, Masculinity. The diagonal value of all the data sets is zero.

TABLE 4. I = Identity matrix

I			
1	0	0	0
0	1	0	0
0	0	1	0
0	0	0	1

Table 4 given the Identity matrix. The matrix diagonal line has values one other value is zero.

TABLE 5. Y

Y			
0	0.277778	0.388889	0.166667
0.222222	0	0.166667	0.5
0.166667	0.388889	0	0.111111
0.444444	0.222222	0.333333	0

Table 5 shows Y value the value got in table 2 normalized data.

TABLE 6. I-Y

I-Y			
1	-0.27778	-0.38889	-0.16667
-0.22222	1	-0.16667	-0.5
-0.16667	-0.38889	1	-0.11111
-0.44444	-0.22222	-0.33333	1

Table 6 calculated the I-Y value. All values are negative but diagonal line values are positive values.

TABLE 7. (I-Y)-1

(I-Y)-1			
2.109233	1.43033	1.468607	1.229882
1.468607	2.336877	1.486738	1.5784
1.103973	1.324566	2.006491	1.069222
1.631785	1.59653	1.651931	2.253777

Table 7 calculated the (I-Y)-1 value. All values are negative but diagonal line values are positive values.

TABLE 8. Total Relation matrix (T)

Total Relation matrix (T)			
1.109233	1.43033	1.468607	1.229882
1.468607	1.336877	1.486738	1.5784
1.103973	1.324566	1.006491	1.069222
1.631785	1.59653	1.651931	1.253777

Table 8 shows the total correlation matrix, the direct correlation matrix, Multiplied by the inverse of the direct correlation matrix value subtracted from the identity matrix.

TABLE 9. Ri & Ci

Ri	Ci
5.238053	5.313598
5.870621	5.688304
4.504253	5.613766
6.134024	5.131281

Table 9 shows the Ri and Ci. All values are Positive values.

TABLE 10. RI+Ci & Ri-Ci, Rank, Identity

Calculation of Ri+Ci and Ri-Ci to get the cause and effect			
Ri+Ci	Ri-Ci	Rank	Identity
10.55165	-0.07555	3	effect
11.55893	0.182317	1	cause
10.11802	-1.10951	4	effect
11.2653	1.002742	2	cause

From the TABLE 4 the Impacts on Uncertainty avoidance is first rank , Masculinity is second rank, Power distance is third rank, and individualism is forth rank.

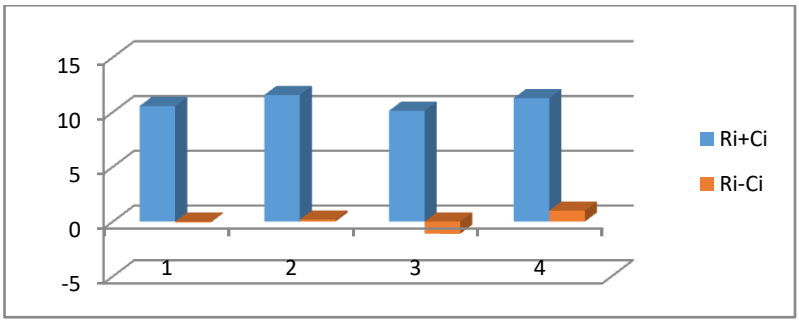

Figure 2 graph is shown in Ri+Ci values and Ri-Ci values.

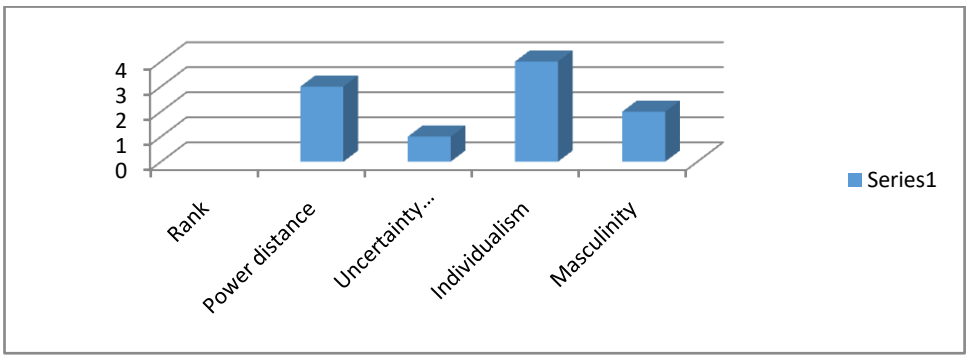

Figure 3 graph is shown in ranking.

Conclusion

We attempted to predict the future. But we worry that all of our past and present experiences will make it more difficult for us to consider the future. We are still using organisational ideas from the 18th century. We recently had a conversation with a senior IT executive who works for one of the top local phone service providers. He thought back to a recent conversation he had with his town's mayor. Executive commuters have been outspoken about the need for better freeway access to the city

centre. "If the things you promised me about the future of communications are true, the last thing we should be spending our money on is your proposed new motorway," the mayor said in response, encapsulating him. Similar to this, even when discussing a virtual entity outside of our conventional legal view of an entity, we frequently refer to the "organisational" design. The organisations of the future will be arranged into relatively tiny companies on closely knit core competences, contrary to how we typically think of businesses which are organised around functions, products, or markets (i.e., centres of excellence). Since knowledge management is a young topic, this helps to explain why its research base is still expanding. KM is used in many organisations despite its vagueness, probable overlap with IM, and shaky theoretical underpinnings. Examining empirical data is undoubtedly a legitimate method for figuring out the theoretical and conceptual foundations. creation of new scientific disciplines. In fact, anthropology and sociology are relatively recent fields of study; culture and society are far older. The empirical data gathered for this study demonstrates that KM encompasses both technical and human/soft components. Organizational practices that make up knowledge management (KM) call for modifications to existing rules, procedures, and structures. In general, IS executives from Australia, Europe, and the US appear to agree on the key difficulties they will confront in the next three to five years. Long-term concerns for these executives include IS strategy planning and IS integration with the enterprise. Middle-level problems like organisational learning and human resources start to appear after the top five problems. In general, the planning and management of the IS department's interaction with the organisation are the main concerns of IS managers in Australia, Europe, and the United States. The issues that Singaporean IS managers deal with differ significantly. We propose that this could be caused by various viewpoints about the stage of development of IS in Singaporean organisations, which could have an impact as a result of the small size of Singaporean organisations and of local business culture.

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