

The Influence of Organisational Culture on the Implementation of Enterprise Resource Planning

Redha M. Elhuni

Abstract—The critical key success factors, which have to be targeted with appropriate change management, are the user acceptance and support of a new Enterprise Resource Planning (ERP) system at the early implementation stages. This becomes even more important in Arab context where national and organisational culture with a different value and belief system, resulting in different management styles, might not complement with Western business culture embedded in the predefined standard business processes of existing ERP packages. This study explains and critically evaluates research into national and organizational culture and the influence of different national cultures on the implementation and reengineering process of ERP packages in an Arab context. Using a case study, realized through a quantitative survey testing five of Martinsons's and Davison's propositions in a Libyan sample company, confirmed the expected results from the literature review that culture has an impact on the implementation process and that employee empowerment is an unavoidable consequence of an ERP implementation.

Keywords—Enterprise resource planning, ERP systems, organisational culture, Arab context

I. INTRODUCTION

AN ERP system is a packaged business software system that allows a company to automate & integrate the majority of its business processes, and share common data and practices across the entire enterprise [1]. ERP also produces and accesses information in a real-time environment. Many companies use ERP software to integrate the enterprise-wide information and process for example their human resources, financial, manufacturing, logistics, sales and marketing functions [2]. ERP was designed mainly to provide a total, integrated company's resource to manage the business process efficiently and effectively. ERP systems have been increasingly adopted by various industries and any company wants to enhance competitiveness by most effectively using all assets including information. One of the major components of the competitive strategy of many businesses is the communication technologies and the strategic emphasis has made it possible for managers to integrate information and communication technologies throughout the organization and link all business units together [3].

The popularity of ERP software began to rise in the early 1990s and it has grown to become one of the most widespread software applications used in managing enterprise wide business processes [4]. One of the dominant features of the

ERP market is that enthusiasm for ERP systems in the industrial area such as chemicals, IT, electronics, textiles, and even in the public sector [3], [5]. Today's ERP system is an outgrowth of Materials Requirement Planning (MRP) systems. As MRP evolved to MRP II, it began to incorporate financial control and the measurement, master production scheduling, and capacity planning [2]. Now, ERP has been extended not only to capture entire functions in the enterprise but also to be integrated with additional functions such as business intelligence and Decision Support Systems [6].

During the 1970s, MRP packages were extended with further applications in order to offer complete support for the entire production planning and control cycle. MRP II was initiated with long-term sales forecast to encompass new functionality such as sales planning, capacity management and scheduling [7]. Then in the 1980s, MRP II was extended towards the more technical areas that cover the product development and production processes. Computer Integrated Manufacturing (CIM) supplied the entire conceptual framework for the integration of all business administrative and technical functions of a company such as financials (accounts receivable and payable), operations and logistics (inventory management & shipping), sales and distribution (order management & sales management), and human resources (personnel planning).

II. CRITICAL SUCCESS FACTORS OF AN ERP SYSTEM

An ERP system can help organizations to reduce costs, reduce rework, and better decision making. ERP systems implementation is a complex exercise in technology innovation and organizational change management [8]-[10] and it is not an easy task. It requires the coordination of many activities of an organization and a close cooperation of employees, managers, IT specialists, business analysts, consultants, and trading partners [11]. Furthermore, the ERP systems implementation differs from the traditional systems implementation in scale, complexity, organizational impact, user's participation, cost, and business impact [12]. Additionally, there is a lack of proven scientific theories and experiences on the implementation of ERP systems in developing economics.

III. RESEARCH ON NATIONAL CULTURE AND CULTURAL DIMENSIONS: CRITICAL ISSUES OF HOFSTEDE [13] AND TROMPENAARS [14]

Hofstede [13] was the first scholar who analysed national culture on an extensive basis. His studies included about 117,000 survey responses in 1969 and 1973 in 66 countries.

R. Elhuni is with the Libyan Petroleum Institute, km 7 Gergarish road, Tripoli, Libya (Phone: +21821483622/27; P. O. Box 6431; e-mail: r.elhuni@lpilibya.com).

His analysis resulted in four dimensions: Power distance index (PDI), which describes the acceptance of unequal power distribution, individualism index (IDV), which indicates loose or close ties between individuals of a society, masculinity index (MAS), which encompasses masculine values like assertiveness and achievement and more feminine values like quality of life and family and the final dimension: Uncertainty avoidance index (UAI), which describes the extent to which unknown situations threaten members of a culture. Later he added a fifth dimension named Confucian Dynamism (CVS), which evaluates a long-term orientation against a short-term orientation in life [13].

Findings of Hofstede [13] enabled him to rate each observed country relatively on an index scale from 0 to 100 for each dimension. Although, [13] findings were derived from an IBM questionnaire which originally was designed and intended to measure the success of a worldwide organizational culture programme, his results were to a large degree confirmed by similar research, conducted by [14] with a similar size, comprising in the raw set some 50,000 cases of 100 different countries [13]. As [14] used a different questionnaire and method to analyse the results, they can only be compared on the basis of a general tendency towards mutual characteristics.

Trompenaars' [14] seven cultural dimensions are partly different to [13] five dimensions but nevertheless overlap to

some extent. Reference [16] concluded when comparing [13] and [14]'s dimensions, as shown in Table I, that the overlapping of some dimensions with several others suggests that the definitions are too general or unclear. Also, [16] identified six similar and partly overlapping cultural dimensions to those referred to above and states "cultural descriptions always refer to the norm or stereotype; they never refer to the behaviour of all people in the culture, nor do they predict the behaviour of any particular person." This has never been the intention of [13] or [14]'s research which is only meant to show the average or the most predictable behaviour of a member of a certain culture in the sense of a "central tendency" as each nation can show an extensive individual variation.

While conclusion and findings of [14] have been widely recognized, they have been especially recently severely criticized to the same extent. Reference [17] considers [14]'s findings as outdated given that the data was gathered some 30 years ago and that the world since has changed significantly, particularly politically; however, he acknowledges his achievement. As this point was critiqued before, [19] claims to have found centuries-old roots, which are solid and only to a very limited extent subject to change over time. Reference [20], sharply criticising [13] analysis methods, concludes that all five assumptions on which [13] based his findings are all "flawed".

TABLE I
HOFSTEDE'S AND TROMPENAARS'S DIMENSIONS ADOPTED FROM [16]

[14]	[13]				
		Power distance	Masculinity vs. femininity	Uncertainty Avoidance	Individualism vs. collectivism
Universalism vs Particularism				X	
Neutral vs. Collectivism		X	X	X	
Individualism vs. collectivism		X	X		X
Specific vs. Diffuse		X		X	
Attitudes vs. Aspiration			X		
Attitudes to time			X	X	
Attitude to the environment				X	

IV. RESEARCH METHODOLOGY

For the primary research, the author decided to use a quantitative approach in light of the language barriers, which tend to be less significant in a quantitative than in a qualitative approach. As the sample size, namely 50 respondents, was relatively small, a quantitative approach would be less time consuming and easier to participate in for the respondents, especially since English was not their native language. Moreover, the evaluation of the responses, when limited to the given statements, is less complicated in quantitative approach. The option of a translation of the statements in Arabic was also considered, but was discarded due to the potential loss of control of the translated content. This could have been overcome by a back translation from a different source, however this source was not available and it would have meant extensive coordination between the two sources. Also the IBM questionnaires, which [14] used for his evaluations, were in English.

The author was aware of the effect that a survey might have on the frame of mind in which the employees formulate their

responses to the questions. A survey might imply impending change and the employees might have wanted to respond in the light of anticipated change. However, since the author's survey was conducted during the implementation of ERP and after the organisational transformation accompanying it, there would be less room for speculation and much more clarity on their view of the situation they currently found themselves in. This implementation experience added more credibility to their responses and increase the validity of the overall results.

A. Questionnaire Design

Each of the five selected propositions was tested with four to six quantitative statements using a seven-category Likert scale, which ranged from strongly agree to strongly disagree. Some of the statements were derived from a similar questionnaire used by [16] which attempted to test the cultural influence on ERP implementations in a European context. An example would be Statements Seven and Nine, which were intended to test Proposition Four. In addition, some statements were designed based on the conclusions of [17], for instance

Statement One and Two to test Proposition One. Some propositions purposely contained two relatively similar statements which were meant to test the attention paid and the clarity of the questions thus similar rating for those would support this. An example is in Proposition Four Statement Seven and Statement Ten for which similar answers are expected. The questionnaire was pre-tested with five Libyan colleagues, whose educational background was engineering.

B. Hypotheses and Sub Hypotheses

The organisational culture in the Libyan sample company, which is predominantly influenced and to a certain extent shaped by national culture has an impact on the ERP implementation process and thus needs to be specifically addressed in the change management process to ensure a smooth ERP implementation and broad user acceptance. If one of the five selected proposition of [17] is confirmed by the quantitative questionnaire survey then it can be said that the organisational culture in the Libyan sample company has an influence on the ERP implementation. Proposition one and nine are considered as valid in the sample company context if the mean score of the statements is below 3.5. In contrast proposition four, five, and eight are considered as valid if the mean score is above 3.5.

V. RESULTS AND DATA ANALYSIS

A. Sample and Survey Realisation

The author considered the material and service department as most appropriate, as the employees' English knowledge appeared to be sufficient for answering the questionnaire. The decision to use the material and service department however, was solely based on their English language knowledge.

The material and service department comprises 68 employees, who received personally addressed cover letters, which were all signed personally by the author to emphasize the importance and thus to increase the response rate. 50 questionnaires were distributed to the material and service department. One week was set as time limit, which was considered as sufficient as the estimated completion time was between 10 and 15 minutes.

B. Return Rate and Comments section

From 50 questionnaires, a total of 35 questionnaires, which accounts for 70%, were returned. As five questionnaires were returned uncompleted, the actual survey response rate comprised 30 questionnaires or 60% of the overall sample. In general, it can be said that the response rate was fairly high when compared to similar research approaches.

C. Results for the Five Selected Propositions

1. Proposition One

Proposition one is related to Hofstede's PDI [13], which for Libya is 80 in the upper medium zone, and relates to the likely IT communication behaviour. The overall survey result with a mean of 3.021, resulting from the four means of the Statements One to Four, clearly confirms the validation of Proposition One for the Libyan sample company which was

defined as valid in case of a mean below 3.50. Although Proposition One shows the highest rate of agreement, it is continuously decreasing from Statement One with a very strong mean of 2.11, which demonstrates a relative strong agreement, to a comparative weak mean of 3.20 for Statement Four. Statement Three with a mean of 2.90 implies that information with subordinates and co-workers is not yet widely shared and released. However, this will be an inevitable and to some extent an automatic result of the ERP implementation and as a consequence it will contribute and facilitate employee empowerment. Further the mean of 2.90 for Statement Three could already be a slight hint that the company is undergoing a change towards a more open dissemination of information approach. Therefore, it is expected that during a later stage of the ERP implementation, this statement would receive a higher average score. In addition, Statement Two with a mean score of 2.75 clearly confirms the findings of [18] that high context cultures such as Libya prefer face to face communication among peers. As a result, Proposition One receives the widest agreement which firstly supports the validation of Proposition One for the Libyan sample company which is at the same time an empirical validation of the theoretical findings of [17] and secondly confirms the hypothesis that culture has an impact on the implementation of enterprise resource software packages.

2. Proposition Four

Proposition Four refers also to Hofstede's PDI [14] and the relative ease or the related problems to initiate IT enabled process change. Although Proposition Four with a mean of 3.37 received the least agreement and is close to 3.50, it cannot be considered as valid for the Libyan sample company as it was defined to be valid if it had scored above 3.50. This result is mainly due to the unexpected low mean for Statement Six scoring only 2.80 which visibly does not fit with the other statements scoring around 3.50 or above. In addition, Statement Nine, scoring 3.85, implies that there are detailed regulations, rules and procedures in the Libyan sample company which seems to be inconsistent with Statement Two that innovative and risk taking individuals are encouraged and rewarded. Finally, only additional interviews of the participants, which would to some extent infringe the confidentiality, could clarify the reasons for the unexpected low mean regarding Statement Six. However, as mentioned under the limitations for this research approach, this was not possible under the given circumstances.

The result for Statement Ten, which implies little or no consultation of employees before a major decision is made, is in line with previous findings and statements from [16], [18] when investigating and describing different business culture. Furthermore, the virtually identical mean scores for Statement Ten and Seven clearly shows the consistency of the answers within this section except for Statement Six as discussed above. However, a slight inconsistency can be discovered when closely examining Statement Eight and Nine which virtually state the same, showing a mean score difference of 0.55 points. Similarly, as above only additional interviews can

bring the reasons for this to light. As a consequence of the observations Proposition Four does not seem to be valid for the Libyan sample company although some statements clearly support the validation. Obviously, the relatively small sample size and the unexpected low scores for Statement Six makes it relative difficult to neglect the validation of Proposition Four.

3. Proposition Five

Like the two previous propositions, Proposition Five is also related to Hofstede's PDI [14] and the adoption of a participative management approach. The mean score of 2.95 undoubtedly does not confirm Proposition Five to be valid for the Libyan sample company. This is reinforced by the fact that Statement Eleven to Statement Fourteen show a unified and consistent mean score below 3.00. However, the mean score of 3.70 for Statement Fifteen entails that management is seen as autocratic which is also underpinned by the following comment: "when they make an important decision they are a little bit autocratic."

As already outlined under Proposition Four, the neglecting of Proposition Five is a further indication of an ongoing change towards a more participative management approach as mean scores of 2.85 and 2.95 for Statement Twelve and Thirteen underpin this as they imply that employees are responsible for the achievement of goals and are encouraged to take responsibility. In addition, Statement Fourteen, scoring 2.70, is in line with the two previous statements highlighting the emerging trend towards a more participative management approach. However, a final clarification could again only be achieved through interviews. Moreover, if the sample had been divided into two groups in order to conduct the same survey at an early stage of the ERP implementation and at a later stage the emerging trends could have been validated more plainly.

4. Proposition Eight

Proposition Eight refers to Hofstede's MAS [14], which for Libya is 52 in the high zone, and relates to the relative difficulties concerning the radical and disruptive forms of IT-enabled process change. Similar to Proposition Four, Proposition Eight received a mean score of 3.40 which is slightly less than the required 3.50 which would imply that Proposition Eight is not valid for the selected sample company. Comparable to Proposition Four most of the mean scores of the Statements from Seventeen to Twenty-two score around 3.50 or above except for Statement Twenty which with its relative low score of 2.55 does not fit in the overall picture. In addition, Statement Twenty receives an average lower score of 0.41 than the related and very similar Statement Nineteen. The reasons behind this relative high difference are not identifiable without additional interviews, which is an apparent limitation of this research approach. The comparatively high mean score of 3.40 for Statement Seventeen indicates that the material and service employees in the sample company are not yet convinced from the potential benefits and performance improvement through the ERP implementation. As particularly in the short term the new

system might negatively influence the performance since considerable extra time has to be invested in order to get the system running. This is also an important point for the management and the German implementation team to consider as user acceptance has obviously implications on the short and principally on the long term performance of the new enterprise system. This is further supported by Statement Twenty-one with a mean of 3.70 which shows that the employees in the sample company are not happy with the ongoing changes which supposedly is related to the ERP implementation and the related organizational changes.

5. Proposition Nine

Proposition Nine makes reference to Hofstede's UAI [14], which with 68 is fairly high for Libya. The mean with 2.95, resulting from the four supporting statements, validates Proposition Nine for the Libyan sample company as a mean below 3.50 was defined for its validity.

Statement Twenty-four scores with 3.52 is relatively high in comparison with the other statements under Proposition Nine. This would imply that there is not a clear and consistent way in doing business in the sample company. However, this could be the result of the ongoing restructuring and change measurements which are undoubtedly inconsistent with the previous way of doing business. Therefore the result for Statement Twenty-four should not be overrated. The low mean score of 2.25 for Statement Twenty-five is in line with the conclusions of [17] for a need of business forecasts and the need for reliability rather than the adaptation to occurring changes in high uncertainty avoidance cultures. This is backed by a mean score of 2.75 for Proposition Twenty-six which indicates a high reliability on past date during the decision making process.

VI. FURTHER RESEARCH

The results firstly confirm to some extent the propositions of [17] and secondly indicate that culture has an implication on the implementation of enterprise systems such as ERP. However, as in this case study, only five out of the twelve propositions could have been tested due to the mentioned limitations, this call for further research, testing all propositions based on a broader and more representative sample, as particularly Proposition Four and Eight have been neglected with very close results. Thus, the resulting conclusions from further case studies would be valid for the prediction of the cultural impact on the implementation of enterprise systems in a Libyan context and could be used and integrated for cultural specific change management programs. Finally, a general investigation how culture might influence the answering behaviour and bias in terms of expressed agreement and disagreement of quantitative questionnaires on which the author's [14] findings are based might require a revaluation of identical statements when comparing with another different culture, resulting from a more loose or firm cultural influenced expression of agreement or disagreement.

VII. SUMMARY

Although not all tested propositions were confirmed, the results undoubtedly show that culture and particularly in this case study - Libyan culture - has an influence on the implementation of enterprise systems in the selected sample company. Additional interviews, which under the given circumstances were not possible, could have contributed to more clarity and might have lead to more concrete and definite results. A broader validation in a Libyan context of the findings can only be hypothetically implied and calls for further research in this and related areas such as cultural differences in the “answering behaviour” of quantitative questionnaires and a repetition of [14] research approach into national culture or a new large scale approach which considers [14] stated limitations.

APPENDIX

TABLE I
QUESTIONNAIRE

Proposition 1	1	2	3	4	5	6	7
1= Strongly agree; 2= agree; 3= tend to agree; 4= neutral; 5= tend to disagree; 6= disagree; 7= strongly disagree							
1 In our company IT like e-mail or groupware (lotus Notes) is often used to communicate from ‘top to down’, for example to inform about new products, from managers to schedule meetings, and for reporting about sales activities’ to team managers							
2 When co-coordinating team work among employees with the same status face to face communication is preferred to the use of IT like e-mail, lotus notes							
3 Information is selectively released to subordinates and co-workers instead of being widely shared among organizational members							
4 I feel the role of computers in our company is to monitor and control the operations							
Proposition 4	1	2	3	4	5	6	7
5 Attempts to create change from management do usually not meet with resistance							
6 Innovative and risk taking individuals are encouraged and rewarded							
7 Employees in our company are encouraged to take part in the decision making process of the company							
8 The policies and procedures in our company are informal							
9 There are no detailed regulations, rules and procedures for most things in our company							
10 Employees and lower level managers are generally consulted before a major organizational decision is made.							
Proposition 5	1	2	3	4	5	6	7
11 In our company authority is delegated so that others can do their work more effectively.							
12 Employees in our company are encouraged to take responsibility.							
13 In our company individuals are responsible for achieving goals and objectives.							
14 In our company employees are involved in the goal-setting process so that goals & objectives are understood & shared.							
15 The management in our company is not autocratic							
Proposition 8	1	2	3	4	5	6	7
16 The ERP implementation will help to improve my performance and will make me more competitive.							
17 Our company would be one of the first to try a new idea.							
18 Change is rather gradual than disruptive in our company.							
19 New and improved ways to do work are continually adopted.							
20 Employees in our company are happy with the change the							

management decides to take place.

21 Our company greatest assets are not its employees

Proposition 9 1 2 3 4 5 6 7

22 We tend to pre-program, structure; have systematic processes in place to facilitate action taking and decision-making, rather than adopting as when challenges and changes occur.

23 There is a clear and consistent set of values that governs the way we do business.

24 I feel we in our company use IT a lot during the decision making process.

25 I feel when we make decisions in our company we rely a lot on past data.

TABLE II
TWELVE PROPOSITIONS BASED ON [1]

Proposition 1a. High power distance cultures will make comparatively more use of IT for vertical communications to monitor and control business activities than low power distance culture.

Proposition 1b. High power distance cultures will make comparatively less use of IT for horizontal communications to integrate and coordinate business activities than low power distance cultures.

Proposition 2. High power distance cultures will be comparatively more likely to maintain the status quo and will be less likely to incorporate clean-slate thinking into their IT-enabled business process change efforts than low power distance cultures.

Proposition 3. High power distance cultures will be comparatively less likely to develop and make use of formal IS plans or process models than low power distance cultures.

Proposition 4. High power distance cultures will find it comparatively easier to initiate IT-enabled process changes than low power distance culture.

Proposition 5. High power distance cultures will find it comparatively more difficult to adopt the participative management approach that is at the core of many IT-enabled process changes than low power distance cultures.

Proposition 6a. Collectivistic cultures will experience comparatively less difficulty in creating process teams than individualistic cultures.

Proposition 6b. Collectivistic cultures will find it comparatively more difficult to initiate and sustain innovation within a process team than individualistic cultures.

Proposition 7. Collectivistic cultures will experience comparatively more difficulty implementing the process based performance appraisal and reward systems associated with IT-enabled changes.

Proposition 8a. Masculine cultures will experience comparatively less difficulty in introducing radical and disruptive forms of IT-enabled process change than feminine cultures.

Proposition 8b. Masculine cultures will experience comparatively less difficulty in successfully implementing radical and disruptive forms of IT-enabled process change than feminine cultures

Proposition 9. Low uncertainty avoidance cultures will make comparatively less use of IT to pre-program decision-making or action-taking.

Proposition 10. Low uncertainty avoidance cultures will be comparatively less likely to make proactive IT-enabled process changes.

Proposition 11. Low Confucian dynamism cultures will have a comparatively greater preference for radical and discontinuous forms of IT-enabled process change than high Confucian dynamism cultures.

Proposition 12. Low Confucian dynamism cultures will be comparatively more likely to implement IT-enabled process change in a rapid manner than high Confucian dynamism cultures.

TABLE III
SUMMARY AND RESULTS

The five selected propositions from [17]			condition	Mean score results	Conclusion
[13]; [14] based on propositions with the respective index for Libya	PDI/80	Proposition one	< 3.5	3.02	Valid in the context of the Libyan sample company
	PDI/ 80	Proposition Four	< 3.5	3.37	Not valid
	PDI/ 80	Proposition Five	< 3.5	2.95	Not valid
	Mas/52	Proposition Eight	< 3.5	3.40	Valid
	UAI/68	Proposition nine	< 3.5	2.95	Valid

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Redha M. Elhuni is an Associated Researcher working for Libyan Petroleum Institute (LPI)- Libya. He received his PhD of Manufacturing Engineering at Teesside University, UK in 2014. He received his Master of Engineering and Manufacturing Management from Coventry University (UK) in 2005, and did his Bachelor's degree in Industrial Engineering at Garyounis University (Benghazi/Libya) in 1997. His research interests include quality management and performance measurement.