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Investigating the Link between Enterprise Resource Planning (ERP) Effectiveness and Supply Chain Management

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Abstract:
This study aims to investigate the link between Enterprise Resource planning (ERP) Effectiveness and Supply Chain Management.
The study population consists of staff in the Electrical Industrial companies. For this purpose, a questionnaire was developed and distributed to (306) employees. Number of (283) questionnaires were returned which comprises 92% of the target sample.
Statistical tools were used to test the hypothesis. The finding of this study indicates that there are significant relationship between Enterprise Resource planning Effectiveness and the Supply Chain Management; the study also we can find negative and no significant relationship between (User Satisfaction, Individual Impact) and Supply Chain Management.
The study made some recommendations regarding future research is therefore required to extend these results in other geographical areas and among managerial employees at these companies. For example, the concept could be extended to other Arab countries in order to validate the model and findings.
Keywords: Enterprise Resource planning, Supply Chain Management, Electrical Industrial

1. Introduction

Today's business environment is characterized by increasing uncertainties. Enterprise resource planning effectiveness has emerged as an important new approach for companies to achieve profit objectives by reducing environmental influence. In Enterprise resource planning with multiple vendors, manufacturers, distributors and retailers, whether regionally or globally dispersed, Enterprise resource planning is challenging because it is difficult to attribute performance results to one particular entity within the chain. Effectiveness in Enterprise resource planning is difficult. With these difficulties in mind, Enterprise resource planning is needed for a number of reasons (including regulatory, marketing and competitiveness reasons).Competitiveness of organizations relies on successful adoption of Enterprise resource planning (Li, 2001).
Enterprise resource planning (ERP) system is a combination of advanced technologies and best business practices. It enables an organization to achieve its specific business objectives and gain a competitive advantage by providing a common platform to integrate all aspects of the business (Dantes & Hasibuan, 2011).
A company needs a big investment for adopting this system to achieve a benefit for organization while implementing an ERP system requires a thorough strategic thinking that allows companies to achieve better understanding of their business processes. ERP system is a software package that needs to be customized in order to meet with business need. We have to consider the change that will happen to the organization, such as: process change, technology change or even organization's structure change, etc. Every technology adoption will have an influence on the organization, both strategically and tactical impacts. This study focuses on the exploration of Enterprise resource planning effectiveness impacts on Supply chain management (SCM) in Jordanian companies.

2. Literature review

2.1 Enterprise Resource Planning Effectiveness

The beginnings Enterprise resource planning system in the 1960s in the form of Material Requirements Planning (MRP) as an outgrowth of early efforts in bill of material. MRP inventors were looking for a better method of ordering material and components. It used the master schedule, the bill of material, and inventory records to determine future requirements. MRP evolved quickly, however, into something more than merely a better way to

order (Mooheba & et al, 2011).
Gartner institute(2004) describe ERP as "Business strategies and enabling software that integrate manufacturing, financial and distribution functions to dynamically balance and optimize enterprise resources". The enterprise system collects data from various key business processes in manufacturing and production, finance and accounting, sales and marketing, and human resources. The system stores data in a single comprehensive data repository where they can be used by other parts of the business (Laudon & Laudon, 2005).
Many companies were not successful when implementing Enterprise resource planning system. It was not caused by implementation approach but because the organizational culture was not ready to adopt this system. However, we have to know that business process and organizational culture are two different things (Dantes & Hasibuan, 2011). Successful ERP implementation has been influenced by ERP implementation approach and the Organization Maturity Level (Dantes & Hasibuan, 2010).
Focusing on this study, six indicators were used to measure the Enterprise resource planning system effectiveness, namely: System Quality, Information Quality, Using ERP Systems, User Satisfaction, Individual Impact, and Individual Impact.

2.2 Supply Chain Management
In the last ten years, a big amount of studies has emphasized the importance of supply chain management for companies (Croom et al., 2000). Both in theory and in practice it is widely recognized nowadays that by integrating information and materials flows throughout the entire supply chain, both the internal and external performance of supply chain partners can be improved significantly. Many authors have remarked, however, that the supply chain management philosophy not only receives big attention from the field of logistics and operations management but also from other areas (Vries & Huijsman, 2011). Management of material and information flow in a supply chain to provide the highest degree of customer satisfaction at the lowest possible cost.
Supply chain management requires the commitment of supply chain partners to work closely to coordinate order generation, order taking, and order fulfillment. They thereby create an extended enterprise spreading far beyond the producer's location. As well as supply chain management system that requires the sharing of the retailer's sales and advertising information with the supplier which is used to generate orders shipped from the supplier based upon projected customer demand. The goal is to reduce inventory and associated handling costs at the retailer (http://www.businessdictionary.com).

3. The objectives of the study
The objective of this research is to determine the impact of Enterprise resource planning effectiveness of industrial companies in Jordan on dimensions of Supply chain management.
Research questions:
To achieve the objective of this research, it requires research to answer questions which are the following:
Q1: What is the impact of Enterprise resource planning effectiveness on the dimensions of Supply chain management?
Can derive the following sub-questions of the main question:
a- What is the impact of Enterprise resource planning effectiveness on the Long term relationship?
b- What is the impact of Enterprise resource planning effectiveness on the Concurrent engineering?
c- What is the impact of Enterprise resource planning effectiveness on the Strategic purchasing?

4. Suggested model
Based on Tsai (2010) Enterprise resource planning system effectiveness and the Deshpande (2012) Supply chain management researcher's model is developed.
A model consists of two types of variables, the independent variable (Enterprise resource planning system effectiveness) and the dependent variable (Supply chain management) as shown in figure (1).

5. Research Hypotheses
To answer the questions posed by the authors, and based on the literature review, the researchers proposed two main null hypotheses as follows:
Ho1: There is no significant relationship between the Enterprise resources planning system effectiveness and the Supply chain management.
In order to test this first main hypothesis, there are sub-hypotheses. These sub-hypotheses are:
Ho1-a: There is no significant relationship between System Quality and Supply chain management.

Ho1-b: There is no significant relationship between Information Quality and Supply chain management.
Ho1-c: There is no significant relationship between Using ERP Systems and Supply chain management.
Ho1-d: There is no significant relationship between User Satisfaction and Supply chain management.
Ho1-e: There is no significant relationship between Individual Impact and Supply chain management.
Ho1-f: There is no significant relationship between Organizational Impact and Supply chain management.

6. Research Methodology

6.1 Population and Sample

To gather data for this study, a random sample of (306) employees was selected from the population of Electrical Industrial companies, number of workforce in these Companies at the 2013 was (1489) employees. Of the (294) questionnaires returned, (11) were rejected due to incomplete responses and (283) responses (92 percent response rate) were used for data analyses.

It should be noted that every questionnaire was personally handed and instructions were given to each employee before completing the questionnaire. In terms of demographic findings, (898%) of respondents were males, and the remaining (10.2%) were females. In terms of the age group of respondents, it is interested to note that (11%) of them are less than (25) years, whereas (15%) fell into the (25-30) age group, whereas (16%), fell into the (31-35) age group, whereas (31%), fell into the (36-40) age group, whereas (21%), fell into the (41-45) age group, only (6%) are above this group. As for the educational levels of these employees, the majority (84%) were university certificate holders, and some those (6%) of these, have Higher Education degree. The respondents had a middle and long experience in their companies, (5%) had (1-5) years experience and (19%) had (6-10) years experience and (57%) had (11-15) years working experience, and (19%) had more than 16 years work experience. See table (1).

6.2 Data Collection

The data and information was gathered from two resources:
Primary Resources:
A study questionnaire was designed to get the primary resources and included two parts:
First: classify data
Second: Measuring the independent and dependent variables performed together with necessary data to test the study hypothesis.
Secondary Resources:
Using the scientific references (Books, articles, etc…) concerned with the study's subject.

6.3 Research Instrument

Enterprise Resource planning System Effectiveness variables which include:
Variables Source
System Quality, Tsai, 2010
Information Quality, Tsai, 2010
Using ERP Systems, Tsai, 2010
User Satisfaction, Tsai, 2010
Individual Impact, Tsai, 2010
Organizational Impact, Tsai, 2010
Supply Chain Management variables which include:
Variables Source
Long Term Relationship, Deshpande, 2012
Concurrent Engineering, Deshpande, 2012
Strategic Purchasing, Deshpande, 2012

6.4 Instrument validity and reliability

Reliability concerns the extent to which an experience, test or any measuring procedure yields the same results on repeated trials. The reliability of the factors needs to be determined to support any measures of validity that may be employed. Both reliability tests and item analysis were recalculated. Table 1 lists the new Cronbach's alpha values, ranging from 0.85 to 0.89. Generally, Cronbach's alpha value exceeding 0.70 is considered to have high internal consistency of scale (Nunnally 1978). All the Cronbach's alpha values in our study are greater than 0.70 (Sekran, 2006).

7. Results

In order to test the first main hypothesis (Ho1), there are six minor ones. These hypotheses are:
Ho1-a: There is no significant relationship between System Quality and Supply chain management.
Pearson correlation was used to test above Hypothesis and it was found that there are significant relationship at (0.05) level between independent variable (System Quality) and Dependent variable (Supply chain management), we can find appositive and significant impact at function level (0.01) which supports hypothesis (Ha1-a), where (r=0.631**) which is moderate, see table (2).
(Ho1-b): There is no significant relationship between Information Quality and Supply chain management.
Pearson correlation was used to test above Hypothesis and it was found that there are significant relationship at (0.05) level between independent variable (Information Quality) and Dependent variable (Supply chain management), we can find appositive and significant impact at function level (0.01) which supports hypothesis (Ha1-b), where (r=0.659**) which is moderate, see table (2).
(Ho1-c) There is no significant relationship between Using ERP Systems and Supply chain management.
Pearson correlation was used to test above Hypothesis and it was found that there are significant relationship at (0.05) level between independent variable (Using ERP Systems) and Dependent variable (Supply chain management), we can find appositive and significant impact at function level (0.01) which supports hypothesis (Ha1-c), where (r=0.482**) which is moderate, see table (2).
(Ho1-d) There is no significant relationship between User Satisfaction and Supply chain management.
Pearson correlation was used to test above Hypothesis and it was found that there are no significant relationship at (0.05) level between independent variable (User Satisfaction) and Dependent variable (Supply chain management), we can find negative and no significant impact, where (r=0.271) which is moderate, see table (2).
(Ho1-e) There is no significant relationship between Individual Impact and Supply chain management.
Pearson correlation was used to test above Hypothesis and it was found that there are no significant relationship at (0.05) level between independent variable (Individual Impact) and Dependent variable (Supply chain management), we can find negative and no significant impact, where (r=0.319) which is moderate, see table (2).
(Ho1-f) There is no significant relationship between Organizational Impact and Supply chain management.
Pearson correlation was used to test above Hypothesis and it was found that there are significant relationship at (0.05) level between independent variable (Organizational Impact) and Dependent variable (Supply chain management), we can find appositive and significant impact at function level (0.05) which supports hypothesis (Ha1-e), where (r=0.396*) which is moderate, see table (2).

8. Conclusion and Recommendations

This research seeks to make an original contribution to knowledge by investigating the relationship between Enterprise Resource planning (ERP) Effectiveness and Supply Chain Management in the Electrical Industrial companies in Jordan.
Factors pertaining to System Quality, Information Quality, Using ERP Systems, User Satisfaction, Individual Impact, and Organizational Impact were a focus of this study as they have an impact on Supply Chain Management.
Contributions found will be beneficial for both academics and managers alike. Academically, this work aims to focus academic attention upon a much neglected domain – the information technology of Industrial companies in Jordan.
There is currently a distinct lack of studies in academia relating to research in the Middle East.
Although this research has provided valuable insights into a somewhat scant area of research, it has been subject to some limitations. To begin with, there were some difficulties in the distribution of the research questionnaire within the Industrial companies in Jordan, possibly leading to some inconsistencies in the data collection process. In addition, this research has been conducted within single Industrial companies and exclusively in the Jordanian Electrical Industrial sector, thus limiting the generalisability of the research results to the foreign companies and other Industrial companies in Jordan.
Future research is therefore required to extend these results in other geographical areas and among managerial employees at these companies. For example, the concept could be extended to other Arab countries in order to validate the model and findings.
Future research should also investigate whether the model could be used for a comparative study between the service sector and the industrial sector, testing for the differences and effects of Enterprise resource planning system dimensions in both sectors. By doing so, it would be interesting to test whether the model could hold across a range of industries and service sectors apart from Electrical Industrial companies.

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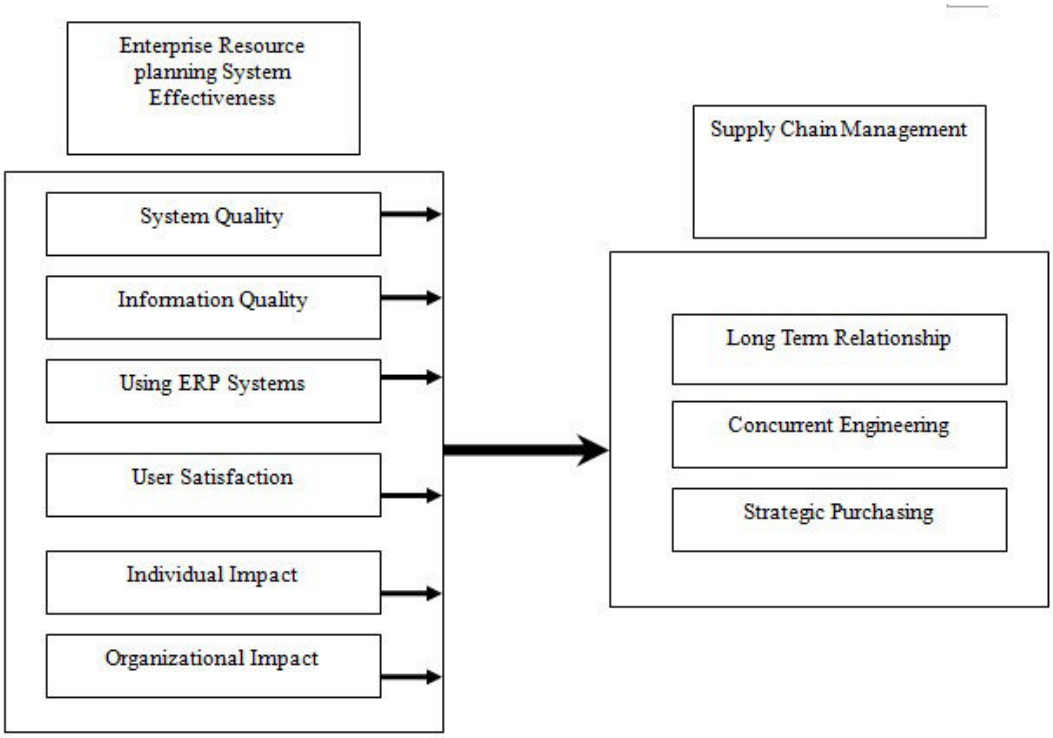

Figure 1. Research Model

Table 1. Demographic Characteristics of respondents (n=283)

Characteristics	Frequency	Percentage
Gender:		
Male	254	89.8%
Female	29	10.2%
Age:		
Less than 25 years	31	11%
25 – 30	43	15%
31 – 35	46	16%
36 – 40	88	31%
41 – 45	59	21%
46 years and more	16	6%
Educational Level:		
Diploma or less	25	9%
Bachelors	239	84%
Master	16	6%
PhD	3	1%
Experience Years:		
1 – 5	15	5%
6 – 10	54	19%
11 – 15	161	57%
16 years and more	53	19%

Table 2. Means, Standard Deviations and Pearson Correlation among the research variables

variables	M	S.D	1	2	3	4	5	6	7
System Quality	3.91	0.418	-						
Information Quality	3.89	0.509	0.542**	-					
Using ERP Systems	3.86	0.598	0.532**	0.480**	-				
User Satisfaction	3.79	0.491	0.266	0.511**	0.491**	-			
Individual Impact	4.01	0.549	0.611**	0.590**	0.481**	0.309	-		
Organizational Impact	4.09	0.531	0.261	0.341	0.398*	0.483**	0.281	-	
Supply Chain Management	3.96	0.431	0.631**	0.659**	0.482**	0.271	0.319	0.396*	-

** Correlation is significant at the 0.01 level.
* Correlation is significant at the 0.05 level.