International Journal of Disaster Recovery and Business Continuity
Vol.11, No. 1, (2020), pp. 2857–2869

Resource Planning of Manufacturing Supply Chain Companies

Lutzer U. Reyes

Abstract

To cope and grow the today's business world and improve competitive advantage, it is necessary for the business to adapt and invest in technology that would benefit on the smooth and effective operations. Hence, the Enterprise Resource Planning (ERP) was introduced under the Supply Chain Management (SCM) and Total Quality Management (TQM) to help business attain its goals. The main objective of the study was to determine the effectiveness of Enterprise Resource Planning System of Manufacturing Supply Chain Companies. The study specifically aimed to access the level of effectiveness of the ERP system in terms of (1) plan, (2) source, (3) make, (4) deliver, (5) finance and (5) quality. The descriptive methodology of research was the most appropriate to use in gathering information. A total of three hundred seventy-five (375) respondents were chosen using random sampling, consisting of top management, middle management and supervisory levels. Results showed that the level of effectiveness of the ERP system as very effective in all aspects. One- Way test revealed no significant differences in the effectiveness of ERP in terms of managerial level, educational attainment and the size/ category of the company. Researcher have recommended the business processes to be designed with clear handoff's and control points that trigger actions and decisions; consider integrating the existing ERP system into the Internet of Things (IoT) systems to transform further the solution as IoT enabled ERP system that connects people, processes, data, and things in one repository; upgrade the ERP System with a module to track quality issues back to their origins, select the best solutions to problems, manage turnaround times for nonconforming products.

Keyword: *enterprise resource planning (ERP), distribution and logistics, finance, manufacturing, supply chain management, total quality management.*

I. INTRODUCTION

Supply chain companies are network between organizations and its suppliers to produce and distribute a specific products or services. The supply chain represents the system of the organization, existing facilities, functions and activities that are involved in production to get the product or services to the customers. This sometimes referred to as 'value chains' wherein the company or organization was adding value to the goods and services as it progresses throughout the chain. This supply chain companies employs management technique to plan, organize and controls was operations then lead the entire organization to become profitable. In broader sense, supply chain management was the integration and management of activities from procurement of materials and services, transforming them into intermediate goods, final products, and delivering the products through a distribution system to the customers. These activities include purchasing and outsourcing activities, manning other functions that are important to the relationship with suppliers and distributors. Supply chain management includes determining the plan, source, make or the manufacturing, delivery, finances and quality (Heizer, 2008).

Along with Total Quality Management, Supply Chain is an important tool that manufacturing companies are using to achieve competitive advantage. These companies seek to acquire the use of tools

Revised Manuscript Received on November xx, 2019.
Lutzer U. Reyes, Department of Computer Engineering, College of Engineering Polytechnic University of the Philippines, Sta. Mesa, Manila, Philippines. Email: luskywalk@gmail.com/ include your pup email

ISSN: 2005-4289 IJDRBC

in order to complete effectively which include quality, efficiency and innovation (Daghfous, 204). Obtaining effective SCM may reduce costs, increase customer satisfaction, profits, revenues, (Poirier and Quinn, 2004) and competitiveness (Chan and Qi, 2003).

The way supply chain is managed can make or break your organization or company. Some of the most spectacular business successes over the past 20 years have come from finding more effective ways to deliver products to consumers, but there have been some major problems along the road they take.

Enterprise Resource Planning (ERP), on the other hand, become an strategic tool which enables companies to synchronize, integrate, and streamline data and processes of the organization into one single system. The American Production and Inventory Control Society define ERP as "a method for the effective planning and controlling of all resources needed to take, make, ship and account for customer orders in a manufacturing, distribution or service organization" (cited by Madanhire & Mbohwa, 2016).

Traditionally, manufacturing companies treat each transaction separately because it is built around strong borders of specified functions that are meant to cater for them (Madanhire & Mbohwa, 2016). In ERP, transactions are not stand- alone and considered as part of interlinked processes that make up the business. Hence, the principle in Systems Theory is considered as "the whole business for is greater than the sum of its parts" (O'Leary, 2000).

Enterprise resource planning system provides companies with transaction processing models that are integrated with other activities of the company, such as production planning and human resources. By implementing standard enterprise processes and a single database that spans the range of enterprise activities and locations, ERP system provide integration across multiple locations and functional areas. Thus, ERP system have led to improved decision-making capabilities that manifest themselves in a wide range of metrics, such as decreased inventory (raw materials, in-process and finished goods), personnel reductions, speeding up the financial close process, and others. Thus, ERP can be used to help companies create value. ERP facilitates value creation by changing the basic nature of organization in several different ways as commented by O'Leary (2000). In addition, the ERP system is capable of allowing managers data sharing between firms, so that managers can potentially distinguish across the complete span of the supply chain (Ali Smadi, 2016; Arnold, Chapman and Clive, 2008). Organizations are recommended to continue to change processes to stay relevant and productive.

The populations of the manufacturing companies based on the 2015 Philippine Statistical Yearbook were 2,720 active manufacturing supply chain companies registered in the National Capital Region (NCR). Forty percent (40%) of which, belongs to medium and large business enterprise. Therefore, we are considering an estimated population of 1,088 covering both medium and large enterprise to participate in the survey. These companies already have implemented Enterprise Resource Planning (ERP) for a quiet time. Hence, this paper attempted to assess the effectiveness of the ERP implementation in managers' point of view and perceptions.

Statement of the Problem

This study aims to assess the effectiveness of the Enterprise Planning System of manufacturing companies in the National Capital Region. Specifically it sought to determine further assessment on the managers' views and evaluation with regards to planning, manufacturing system, sourcing, delivery system, financial system and product quality management.

Research Paradigm

This study includes both assessment and hypotheses proofing. The assessment focused on the Enterprise Resource Planning (ERP) factors. These factors were used to determine significant differences in the profile of the respondents. Figure 1 illustrates the paradigm of the study.

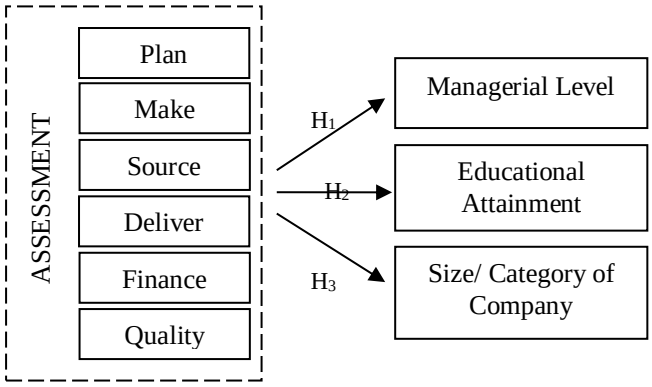

Figure 1. Research Paradigm

Research Hypotheses

H_1: There is significant difference on the effectiveness of the ERP in terms of managerial level.
H_2: Managers assessment on the effectiveness of ERP differs according to their educational attainment.
H_3: There is a significant difference in the level of effectiveness among ERP system in terms of size/ category of the company as assessed by the managers.

II. METHODOLOGY

The researcher used the descriptive method of research to provide an accurate description of the situation. This makes very appropriate for this study because it aims to assessment the effectiveness of Enterprise Resource Planning (ERP) System by the Manufacturing Supply Chain companies in the National Capital Region of the Philippines, the descriptive method of research was the most appropriate in gather information.

This study employed 375 respondents consisted of 105 top- level managers, 265 middle managers and 5 supervisors from the 300 manufacturing companies who have Supply Chain Management and ERP system. These manufacturing companies consisted of 20 small, 55 medium and 225 large enterprises. Majority of these companies implemented Enterprise Resource Planning for more than 9 years and majority were operating 17 years and above.

Research Instrument

This study used a self- constructed questionnaire consisted of Respondents' Profile, Company Profile and Enterprise Resource Planning Factors. To assess the effectiveness of the ERP system, the researcher used the 5- point Likert Scale Level of Effectiveness, as shown in Table 1.

Table 1.
Likert Scale

Scale	Range	Level of Effectiveness
5	4.21 – 5.00	Very Effective
4	3.41 - 4.20	Effective
3	2.61 – 3.40	Somewhat Effective

ISSN: 2005-4289 IJDRBC

2	1.81 – 2.60	Less Effective
1	1.00 – 1.80	Not Effective at all

Statistical Treatment

The Statistical Package for Social Sciences version 22 was used to generate accurate and reliable data. For the analysis, the researcher used the following statistical treatments:

a. Frequency and Percentage- used to present the distribution of the respondents' profile.

b. Weighted Mean- used in determining common responses of certain indicators. It is a mean of a set of values that has different way o value of importance.

$$wm = \frac{\sum fx}{N}$$

Where: *f*= frequency or weighting factor
wm= Weighted Center
N= total population

c. One way ANOVA Test- This was used to test the significant differences in the perception of the respondents. This was applied on the assessment regarding the effectiveness of the Enterprise Resource Planning (ERP) system that was being used by the company.

$$F = \frac{MST}{MSE}$$

Where, MST= mean square between groups
MSE= man square due to error (within groups)

III. RESULTS AND DISCUSSIONS

There were only few studies concerning assessment of ERP in manufacturing companies considering the managers' viewpoint. Hence, this study aimed at contributing to the body of knowledge and as references for similar studies in the future.

Effectiveness of Enterprise Resource Planning (ERP) of Manufacturing Supply Chain Company

The respondents' perception on the assessment of resource planning of manufacturing supply chain companies specifically on the aspect of plan was 'very effective' *(4.77)* as shown in Table 2.

Table 2
Effectiveness of Enterprise Resource Planning (ERP) in Terms of Plan

Indicators	Weighted Mean	Level of Effectiveness
Helping the company to realize that the application system was a value-enabler.	4.86	Very Effective
Helping the company to achieve its goals.	4.83	Very Effective
Helping the company to achieve its objectives.	4.73	Very Effective
Aligning the business process as defined in the initial planning session.	4.77	Very Effective

Encouraging accountability in all functions.	4.80	Very Effective
Encouraging the employee to be innovative.	4.66	Very Effective
Providing correct data/ information for the management strategic planning.	4.79	Very Effective
Aligning supply and distribution strategies with the organizational strategy.	4.78	Very Effective
Helping the company to see areas for improvement.	4.74	Very Effective
Providing solutions for the company.	4.78	Very Effective
Overall Weighted Mean	**4.77**	**Very Effective**

It can be observed in the results that all indicators were rated Very Effective by the managers. It can be gleaned that ERP is very effective in helping the company in realizing that application system is a value- enabler *(4.86)* and it helps the company in achieving its goals *(4.83)* and objectives *(4.73)*. With ERP system, company will able to effectively align business processes as defined in the initial planning stage *(4.77)*, provide correct data/ information for management strategic planning *(4.79)*, align supply and distribution strategies *(4.78)* and provide solutions for the company *(4.78)*. In planning also, ERP is also effective in encouraging accountability in all functions *(4.80)*, helping the company to see improvements *(4.74)* and in encouraging employees to be innovative *(4.66)*.

Change was inevitable; however, it can be either harrowing or exciting (Shivalker, 2014). Implementing an ERP – Enterprise Resource Planning system without proper change management can have a cascading effect on the morale of your employees, on their performance, on productivity and hence forth the bottom line. Many employees are averse to changes, initially there might be apprehensions and even resistance towards implementation of a new ERP system or towards upgrading to a new ERP system; however, this transition can be made easy and smooth via effective management. Researchers have concluded that top management's support and personnel education and training of the software and planning processes are of utmost importance for successful implementation of an ERP system, but also for running the system after implementation (Petroni, 2002; Muscatello et al., 2003). The need for accurate data is high when working with finite capacity and actual planning (APICS, 2007). Data collection and validation, consequently, have to be conducted in appropriate ways (Jonsson & Kjellsdotter, 2007).

To achieve the capacity necessary and unleash the potential of a demand-driven supply chain, there must be alignment across employee roles and responsibilities, processes and technology. The key was a comprehensive set of requirements that form an integrated solution across the functions and suppliers.

Table 3
Effectiveness of Enterprise Resource Planning (ERP) in Terms of Source

Indicators	Weighted Mean	Level of Effectiveness
Recording complex transactions of its supplier partners.	4.73	Very Effective
Identifying if supplier has raw materials near the warehouse.	4.83	Very Effective

Generating reports for product cost analysis.	4.87	Very Effective
Generating reports for supply market analysis.	4.66	Very Effective
Helping the company to develop sourcing strategy.	4.79	Very Effective
Recording of supplier profile was very thorough.	4.80	Very Effective
Getting supplier performance.	4.82	Very Effective
Capturing purchasing data.	4.76	Very Effective
Giving accurate data for supplier negotiation.	4.80	Very Effective
Giving who among the suppliers has the smallest delivery lead time.	4.74	Very Effective
Matching the supply and market demand.	4.69	Very Effective
Overall Weighted Mean	**4.77**	**Very Effective**

When it comes to sourcing, the ERP system also is very effective *(4.77)* especially when it comes to generating reports for product costs and analysis *(4.87)*, and supply market analysis *(4.66)*. It helps the company in identifying suppliers with raw materials near the warehouse *(4.83)*, getting supplier performance *(4.82)*, recording supplier profile *(4.80)* and giving accurate data for supplier negotiation *(4.80)*. ERP also helps the company in developing sourcing strategy *(4.79)*, capturing purchasing data *(4.76)*, record suppliers with smallest delivery lead time *(4.74)*, recording complex transactions of its supplier partners *(4.73)*, and matching supply and demand market *(4.69)*.

Studies have shown that sourcing especially from low-cost sources, are harder to manage when it comes to cost versus response trade-off (Nair and Closs, 2006; Lowson, 2003). The reason is that the longer lead times and less dependable deliveries from suppliers require companies to maintain higher safety stocks to preserve the same service level (Golini & Kalchschmidt, 2011) thus increases cost (Handfield, 1994). By making Quality Management (QM) as an integral part of the supply chain, companies can avoid being reactive to supply chain requirements and can strive in meeting their demands more proactive (Love, et al, 2003).

As one of the main goals of supply chain, customer satisfaction is obtainable when the company has the certain degree of knowledge about their partners including suppliers, customers, and product end-users. It is necessary to know their profile as it is a good indication of the meaningful interaction and can give a competitive advantage in the supply chain (Gooch, 2001).

Furthermore, integrating one existing ERP system with business analytics solution requires software that further speed up generation of management reports for fast and accurate decision making for the welfare of the company. To support this, there are many tools—such as ERP, business intelligence (BI) and cloud computing—used today. Unfortunately, many are underutilized or used ineffectively. In many cases, companies invested in the tools, but business process owners and business analysts are not trained to maximize the full potential of the tools.

Table 4
Effectiveness of Enterprise Resource Planning (ERP) in Terms of Make (Manufacturing)

Indicators	Weighted Mean	Level of Effectiveness
Adopting to the company's complex manufacturing process.	4.72	Very Effective
Optimizing the manufacturing process.	4.82	Very Effective
In the integration of subcontractors manufacturing process.	4.78	Very Effective
Mapping the manufacturing shop floor design.	4.71	Very Effective
Monitoring the warehouse operation.	4.69	Very Effective
Keeping product build specifications versioning for the customers.	4.60	Very Effective
In the integration of machine operation.	4.79	Very Effective
Capturing machine output data.	4.79	Very Effective
Monitoring control limits of all manufacturing machines.	4.74	Very Effective
Generating reports for the machines utilization.	4.82	Very Effective
Overall Weighted Mean	**4.75**	**Very Effective**

Another of the Enterprise Resource Planning system is the make or the manufacturing. Managers also rated Very Effective *(4.75)* this area. This area of the business is the one that has complex and critical system from the machineries to warehousing, production and generating produce quality products. ERP system has become an effective and helpful tool in addressing issues in this aspect. With the ERP, managers were able to generates of machine utilization *(4.82)* and optimize manufacturing process *(4.82).* It is also helpful in the integration of machine operation *(4.79)*, capturing machine output data *(4.79)*, integrating subcontractors manufacturing process *(4.78)*, monitoring control limits of machines *(4.74)*, adopting company's manufacturing processes *(4.72)*, mapping floor design *(4.71)*, monitoring warehouse operations *(4.69)*, and product build specifications versioning for the customers *(4.60)*.

One of the most effective ways to create value was by investing in IT systems that bring every aspect of your business together under one roof (Davis, 2016). Enterprise Resource Planning (ERP) applications can turn disorganized firms into sustainable, streamlined market leaders - providing value for customers, employees and owners alike.

Some of the latest technology in ERP software was the ability to use wireless scanning and printing. This creates a seamless route of communication between supervisors and employees, especially when used with smartphones, headsets and vehicles equipped with printers. Some areas have increased efficiency provided by the ERP system.

Manufacturers can also include in their plans various requirements, ranging from certificates of conformance, product specifications, employee IDs, and transaction IDs to other details essential to achieve a certain quality level.

In today's global competitive market delivery dependability is considered an order qualifier along with quality and price of a product (Thatte, Agrawal & Muhammed, 2009).

In terms of delivery, managers rated the level of effectiveness as Very effective *(4.74)* as shown in Table 5.

Table 5
Effectiveness of Enterprise Resource Planning (ERP) in Terms of Deliver

Indicators	Weighted Mean	Level of Effectiveness
Monitoring product delivery.	4.79	Very Effective
Updating of forward flow of goods.	4.71	Very Effective
Monitoring the reverse flow of goods.	4.78	Very Effective
Keeping distribution centers updated.	4.71	Very Effective
Reporting discrepancies.	4.83	Very Effective
Keeping the delivery schedule updated.	4.82	Very Effective
Tracking service level commitment.	4.75	Very Effective
Keeping different route plan of delivery.	4.58	Very Effective
Monitoring the actual location of the shipment.	4.57	Very Effective
Handling misrouted delivery situations.	4.79	Very Effective
Generating fast and accurate delivery schedules.	4.83	Very Effective
Tracking late deliveries.	4.76	Very Effective
Overall Weighted Mean	**4.74**	**Very Effective**

When looking at the individual means, ERP helps company in reporting discrepancies *(4.83)* and generating fast and accurate delivery schedules *(4.83)* and keeping delivery schedules *(4.82)*. Companies also will able to monitor product delivery *(4.79)* and reverse flow of goods *(4.78)* and also handling of misrouted delivery situations *(4.79).* ERP is also effective in tracking late deliveries *(4.76)* and service level commitment *(4.75)*. Managers can effectively update forward flow of goods *(4.71)* and distribution centers *(4.71)* as well as keeping delivery route plans *(4.58)* and monitoring actual locations of shipments *(4.57).*

The development of logistics activities was necessary in order to abide on the management concept of 'Just in –Time' (JIT) (Adair- Heeley, 1988; Das & Handfield, 1997) which allows one to reduce inventories in the entire value chain instead of simply pushing back inventories on suppliers and the management of technology in supplier management requires active involvement of the supply chain members (Ross, 1998). Geographical distance often implies longer lead-times and increases in variability (Golini & Kalchschmidt, 2011).

One of the main causes of misrouted and delayed shipment was that the warehouse doesn't process orders deliveries based on priority. An effective solution was to synchronize picking and shipping activities based on transport routes (route starting time, allocated customers, etc.). Several researchers emphasized collaboration and information sharing to attaining customer responsiveness, and creating value for both buyers and suppliers (Thatte, Agrawal & Muhammed, 2009; Rossetti and Choi, 2005;

Peleg et al., 2002; Monzka et al., 1998; DeToni and Nassimbeni, 1999). Researchers also argued that reliability and responsiveness of customers plays a vital role in the shortening a firm's delivery cycle (Srivastava, 2006).

Table 6
Effectiveness of Enterprise Resource Planning (ERP) in Terms of Finance

Indicators	Weighted Mean	Level of Effectiveness
Returning the cost of investment.	4.81	Very Effective
Saving end users time.	4.81	Very Effective
Reducing the overall operating cost after implementing the system.	4.73	Very Effective
Reducing redundant manpower.	4.68	Very Effective
Improving forecasting process.	4.73	Very Effective
Generating timely financial reports.	4.87	Very Effective
Creating change management.	4.79	Very Effective
Improving audit results.	4.77	Very Effective
Enhancing the usefulness to investor and stakeholders.	4.77	Very Effective
Strengthening control and security of data.	4.84	Very Effective
Overall Weighted Mean	**4.78**	**Very Effective**

Finance is another area which the ERP system has integrated for the manufacturing company operations. Managers rated Vey Effective in this area *(4.78)*. Sustaining quality efforts all the way through the chain has significant implications in reducing costs (Forker, et al, 1997).

As mentioned, ERP is very effective in generating timely financial reports *(4.87)* with its strengthened control and security of data *(4.84)*. Furthermore, through ERP system, managers and the company itself will able to returning the cost of investment *(4.81)* and effective in saving end- users time *(4.81)*. It creates change in environment *(4.79)*, enhances usefulness to investors and stakeholders *(4.77)*, improves audit results *(4.77)*, reduces overall operating costs *(4.73)*, improves forecasting process *(4.73)* and reduces manpower redundancies *(4.68)*.

Generally, most companies envision improved performance and reduced costs. If you're moving from a spreadsheet environment, you probably want to reduce redundant data entry and possibly reduce manpower. If you already have a system, it may not scale to your company's growth.

It's probably already clear the impact increased communication and inventory management have on eliminating waste. But there's one more area to eliminating waste that ERP helps with: employee efficiency. When workers have the tools, they need for communication; they can perform their jobs more efficiently.

Meanwhile, the quality requirements from the manufacturer's viewpoint may be the optimum integration and utilization of resources to satisfy the internal and external customers in terms of goods and services offered (Sharma, Garg, & Agarwal, 2012).

Table 7
Effectiveness of Enterprise Resource Planning (ERP) in Terms of Quality

Indicators	Weighted Mean	Level of Effectiveness
Reducing error and inconsistencies.	4.84	Very Effective
Processing very high volume of transactions.	4.77	Very Effective
In the integration all processing functions.	4.81	Very Effective
In making products based on customer expectations.	4.79	Very Effective
In creating reliable products.	4.72	Very Effective
In making customer satisfied with the products.	4.81	Very Effective
Establishing good image to customers.	4.81	Very Effective
Keeping the brand positive to customers.	4.76	Very Effective
Keeping the products in superior quality.	4.74	Very Effective
Creating customer empathy.	4.74	Very Effective
Overall Weighted Mean	**4.78**	**Very Effective**

When looking at the effectiveness of the ERP to managers, responses revealed Very Effective at all indicators and in general *(4.78)*. Managers found ERP to be very effective in terms of reducing errors and inconsistencies *(4.84)*, integrating all processing functions *(4.81)*, making customer satisfaction of the products *(4.81)* and establishing good image to customers *(4.81)*. Managers also found ERP to be effective in creating products based on the customer expectations *(4.79)*, processing very high volume of transactions *(4.77)*, keeping the brand to customer *(4.76)*, keeping the products in superior quality *(4.74)*, creating customer empathy *(4.74)* and reliable products *(4.72)*.

Product quality refers to a suitability of product to meet customers' needs and satisfaction (Ryan, 2011) and the product characteristics of engineering and manufacture determines the degree to which the product will meet the expectations of the customer (Reeves and Bednar, 1994 as cited in Lotfi, Sahran, Mukhtar & Ali Taei Zadeh, 2013).

Moreover, it is important to develop and build long- term customer relationship and deliver customer satisfaction (Sheridan, 1998; Tan, Khanan & Handfield, 1998)

With all these assessments on the Enterprise Resource Planning, the bottom line is that the company should address variation in the manufacturing process to improve quality in the manufacturing process. The company should maximize the use of the manufacturing module of ERP because by configuring ERP systems to track all variations, send alerts before deviations exceed preset values, and automatically take certain corrective actions, you can expect to manufacture higher quality products over time.

One-Way Analysis of Variance (ANOVA)

To determine significant differences among the perception of top management, middle management and supervisor's assessment of the Effectiveness of Resource Planning of Manufacturing Supply Chain Companies, the analysis of variance or ANOVA is applied. The results of the application of the test

statistics will be presented, and discussed below:

Table 8
One- Way ANOVA Test of Significant Difference

Profile	Plan	Source	Make	Deliver	Finance	Quality
Managerial Level	0.954	0.953	0.892	0.969	0.825	0.739
Educational Attainment	0.559	0.796	0.545	0.647	0.775	0.804
Size/ category of company	0.270	0.190	0.422	0.342	0.250	0.198

**Significant at .05 level.*

Results in Table 8 revealed no significant differences in the level of effectiveness of the ERP in terms managerial level, educational attainment and size/ category of company. These mean that the implementation of the ERP in the manufacturing company have equal perceived effectiveness for both the managers and the company and at all areas. No similar studies can prove the results however, it can be considered by evidence that the goals of the implementation of the ERP are to reduce costs (Forker, et al, 1997), generate accurate reports, attain customer satisfaction (Sheridan, 1998; Tan, Khanan & Handfield, 1998) and expectations (Reeves and Bednar, 1994), build and develop long- term customer relationship, shortened lead time and delivery cycle (Srivastava, 2006), creating plans and schedule (Scrutu & Lupu, 2016), create inventories and deliver quality products at valued price (Thatte, Agrawal & Muhammed, 2009). The implementation of the ERP also has greatly helped the managers in streamlining and facilitating decision- making (Scrutu and Lupu, 2016). The results of the assessments also implied unanimous perception of effectiveness and benefits as to how ERP have helped and impacted their operations and performance.

IV. CONCLUSIONS

It is no doubt that ERP is considered to be one of the most innovative advances in the Information Technology used by many companies particularly manufacturing. Such system has helped effectively managers and companies in the day- to- day operations of the business. The results of the assessments emphasized ERP as very effective according to the perceptions of the managers. ERP though confusing and little complex, is very effective in making reports, plans, schedules, mapping, tracking transactions, inventories, identifying discrepancies, monitoring transactions and machine utilizations, customer and supplier profiling, product quality assurance and reduction of costs. Because of its complexity and confusing functions, it requires thorough skills and knowledge in operating. With ERP, customer satisfaction can be attained and maintained.

The results of the One- way ANOVA test have revealed no significant differences in the level of effectiveness of ERP to managers in terms of planning, manufacturing, sourcing/ procurement, delivery, finance and quality.

V. RECOMMENDATIONS

In the light of the above findings and conclusions of the study, the following recommendations were hereby endorsed:

1. There must be continuous and adequate training and seminars for all employees involved. The training and seminar programs should specifically be directed on improving capabilities particularly in diagnosing, troubleshooting and development pertaining to critical issues on the enterprise resource planning application system.

3. Enhance the skills of their employee in the supply chain management for them to maintain the stability of the operation in alignment to the enterprise resource planning application system.

4. Consider integrating the existing ERP system into the Internet of Things (IoT) software and

systems to transform this further as IoT enabled ERP solutions connect people, processes, data, and things in one repository. In today's technology, IoT was anticipated to enhanced ERP system efficiency, facilitate new business models, and align physical operations with digital assets on a real-time basis.

5. Improve planning. Product quality starts with a plan. Using a manufacturing ERP solution to develop a quality plan will ensure that all your employees will follow the same route, from raw material procurement throughout production to delivery.

6. Ensure entry of accurate data. The company should educate its users the concept of "garbage-in, garbage-out" principle. Manufacturing high-quality products consistently was impossible without timely, accurate, and complete ERP data.

7. It was strongly recommended that the existing ERP system be integrated with business analytics solution software to further speed up generation of management reports for fast and accurate decision making for the welfare of the company.

8. Closely monitor thru audit all outsourced partners in the entire supply chain so that the company can sustain a good and quality product.

9. Improved communication, managed inventory and elimination of waste all work together through your ERP solutions.

REFERENCES

1. Adair-Heeley, C.B., (1988). JIT purchasing: seven steps for successful implementation. Production and Inventory Management Review and APICS News, 8 (12), 22–23.
2. Ali Smadi, Z.M. (2016). The Operational Benefits of Enterprise Resource Planning (ERP): A Case Study on Food Processing and Manufacturing Companies in Jordan. International Journal of Business and Social Science, Vol. 7, No. 2, pp 21-38.
3. APICS (2007), Using Information Technology to Enable Supply Chain Management, APICS Certified Supply Chain Professional Learning System, APICS, Alexandria, VA.
4. Arnold J.R., Chapman, S. & Clive, L. (2008). Introduction to Material Management, Pearson Education, Inc., Pearson Prentice Hall, U.S.A. p30.
5. Chan,F.T.S. andQi,H.J. (2003), "Feasibility of measurement system for supply chain: a process-based performance approach and measures", Integrated Manufacturing Systems, Vol. 14, No. 3, pp. 179-90.
6. Daghfous, A. (2004), "Absorptive capacity and the implementation of knowledge-intensive best practices", S.A.M. Advanced Management Journal, Vol. 69 No. 2, pp. 21-7.
7. Das, A. & Handfield, R.B. (1997). Just-in-time and logistics in global sourcing: An empirical study. International Journal of Physical Distribution & Logistics Management, 27 (3), 244.
8. De Toni, A. and Nassimbeni, G. (1999), "Buyer–supplier operational practices, sourcing policies and plant performance: result of an empirical research", International Journal of Production Research, 37, pp. 597– 619.
9. Golini, R., Kalchschmidt, M., (2011). Moderating the impact of global sourcing on inventories through supply chain management. International Journal of Production Economics 133 (1), 86-94.
10. Gooch,M. (2001), "Identifying the factors that have greatest influence on the performance of agribusiness supply chains", unpublished, completed as part of Master's in agribusiness Degree, University of Queensland Gatton.
11. Handfield, R.B., (1994). US Global Sourcing: Patterns of Development. International Journal of Operation & Production Management, 14 (6), 40-51.
12. Heizer, J. Render B.(2008). Principles of Operations Management 5th Edition, Pearson Higher Education.
13. Jonsson, P. & Kjellsdotter, L. (2007). Applying advanced planning systems for supply chain planning: three case studies. International Journal of Physical Distribution & Logistics Management, 37 (10), pp 816-834.

14. Lotfi, Z., Sahran, S., Mukhtar, M & Taei Zadeh, A. (2013). The Relationships between Supply Chain Integration and Product Quality. The 4th International Conference on Electrical Engineering and Informatics, Procedia Technology 11, pp 471 – 478.
15. Love, P.E.D., Irani, Z. and Edwards,D.J. (2003), "Learning to reduce rework in projects: analysis of firm's organizational learning and quality practices", Project Management Journal, Vol. 34,No. 3, pp. 13-25.
16. Lowson, R. H, (2003). Apparel sourcing: assessing the true operational cost. Science and Technology, 15 (5), 335-345.
17. Madanhire, I. & Mbohwa, C. (2016). Enterprise resource planning (ERP) in improving operational efficiency: Case study. Procedia CIRP, 40 (2016), pp. 225 – 229.
18. Monczka, R. M., Petersen, K. J., Handfield, R. B., and Ragatz, G. L. (1998), "Success Factors in Strategic Supplier Alliances: the Buying Company Perspective", Decision Science, 29(3), pp. 5553-5577.
19. Muscatello, J., Small, M. and Chen, I. (2003), "Implementing enterprise resource planning (ERP) systems in small and midsize manufacturing firms", International Journal of Operations & Production Management, Vol. 23 No. 8, pp. 850-71.
20. Nair, A., & Closs, D. J, (2006). An examination of the impact of coordinating supply chain policies and price markdowns on short lifecycle product retail performance. International Journal of Production Economics, 102 (2), 379-392.
21. O'Leary, D. (2000). Enterprise Resource Planning Systems: Systems, Life Cycle, Electronic Commerce and Risk. New York: Cambridge University Press.
22. Peleg, B., Lee, H. L., and Hausman, W. H. (2002), "Short-Term E-Procurement Strategies versus Long- Term Contracts", Production & Operations Management, 11(4), pp. 458-479.
23. Petroni, A. (2002), "Critical factors of MRP implementation in small and medium-sized firms", International Journal of Operations & Production Management, Vol. 22 No. 3, pp. 329-48.
24. Poirier, C. and Quinn, F.J. (2004), "How are we doing? A survey of supply chain progress", Supply Chain Management Review, Vol. 8No. 8, pp. 24-31.
25. Reeves C.A., Bednar D.A. (1994). Defining quality: alternatives and implications, Academy of Management Review, 419-445.
26. Ross J. (1998). The ERP Revolution: Surviving versus thriving. MIT White Paper, Cambridge, MA.
27. Rossetti, C. and Choi, T.Y. (2005), "On the Dark Side of Strategic Sourcing: Experiences from the Aerospace Industry", Academy of Management Executive, 19(1), pp. 46-60.
28. Ryan T.P. (2011). Statistical methods for quality improvement, Wiley.
29. Sheridan, JH (1998). The supply-chain paradox. Industry Week, 247(3):20–9.
30. Shivalker, C. (2014) Change Management with ERP Implementation, Insights White Paper.
31. Srivastava, S.K. (2006), "Logistics and Supply Chain Practices in India", The Journal of Business Perspectives", 10(3), pp. 69-79.
32. Tan KC, Kannan VR, Handfield RB. (1998). Supply chain management: supplier performance and firm performance. International Journal of Purchasing and Materials Management, 34(3):2–9.
33. Thatte, A., Agrawal, V. & Muhammed, S. (2009). Linking Information Sharing And Supplier Network Responsiveness With Delivery Dependability Of A Firm. The Journal of Applied Business Research, Vol. 25, No. 3, pp 37-56.