ERP Framework Design for SME: A Solution for an Effective Management for Garments Manufacturing

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Abstract - *Today's market climate is one that encourages collaboration. Enterprises often recognize the need to incorporate integrated-enterprise programs in order to do this. At present, ERP systems offers models which are hard to implement in Small and Medium Enterprises (SME) due to some limitations and issues such as mutual synchronization of multi-type resources, limited customization, bulky upgrading cost, solution integration, industry functionality, backup hedge and technology updates. These issues somewhat build the implementation of ERP systems distressing, complex and time consuming and generates the massive change in ERP framework to enhance ERP systems infrastructure and functionality. This research aimed to discuss the positive characteristics associated with ERP systems in SMEs; to design an ERP framework for garment manufacturing industry in favor of SME community; and to design the prototype of the ERP system framework. Human-centered design methodology was used in the research as a main method which comprises 3 phases namely, (1) Inspire; (2) Ideate; (3) Implement. The results discussed that positive outcomes of ERP are reduced data entry errors and cost reduction. Increased operational efficiency can also be observed when properly implemented along with better insights. The proposed framework design initiates different ERP occurrences. It was designed specifically for the X Apparel Enterprise. Thus, implementing ERP system framework design in garments manufacturing industry, getting sustainable garment quality through continuous quality improvement to meet customer quality requirement and high customer satisfaction will certainly be met and/or achieved regardless of constraints.*

Keywords: *Enterprise, ERP, SME, Framework*

INTRODUCTION

The ability to provide an integrated suite of business applications is known as enterprise resource planning (ERP). ERP software uses a standard process and data model to cover a wide range of operational end-to-end processes, including finance, HR, distribution, production, service, and supply chain management.

ERP systems automate and help a variety of administrative and operational business processes in a variety of sectors, including line of business, customer-facing, administrative, and asset management. ERP implementations are time-consuming and costly, and some companies fail to identify the business benefits. [1-2]

The purchase and implementation of an ERP system is a strategic decision that can have a direct impact on a company's future competitiveness and success. Due to budget constraints, today's ERP provides costly models that are difficult to implement in SMEs. [3]

The SME of garments manufacturing industry has also contributed significantly to the socio-economic development with its labor-intensive structure and employment-friendly nature. The sector continues to be the one that generates the highest number of jobs within whole manufacturing industry, and even within all economical fields. In garment manufacturing industry, approximately 75 percent of the employees

are female. Thus the sector provides a huge contribution also in the socio-economic sense. [4]

In the Philippines, labor costs of garments industry are getting higher every year because the government legislates higher wages. On top of this, the Philippines has a reputation for having strident unions that in the past years paralyzed garments factories that employed many thousands of workers. [5]

Moreover, many issues have arose in the garments industry especially in management of production. Garment production is an organized activity consisting of sequential processes such as laying, marking, cutting, stitching, checking, finishing, pressing and packaging. This is a process of converting raw materials into finished products. It will be difficult to maintain the industry if production is not, up to the mark if the preproduction phase of preparation of material is not properly carried out. Thus, this problem resulted to unmatched estimated production or output. [6]

Another problem that the garments industry they have faced is the monitoring of revenue. Garments industries deal with many variables such as seasonal demand, multi-channel demand, and drastic changes in fashion, styles, and colors. Apart from this the economic complexities also influence the buying power of the consumers ultimately affecting the apparel industries and their profit margins. So, good ERP system tools are needed to review the past performance of the industry, and forecast for the future possibilities. A recent research report reveals that with appropriate tool, revenue can increase from 2% to 5%, and reduces inventories from 7% to 15% lesser. The profitability of a new product launch can be up to 20%. Hence, implementing the process enhances revenue management and also enriches teamwork both at the executive level and operations management. [7-9]

In view of the aforementioned discussions, need of framework design for ERP system for garments manufacturing industry arises. Abukari and Valashi emphasized that in order to successfully implement ERP solutions, the management and implementers should have a broad understanding of the ERP systems architecture and the specific components which might be required for any business needs. Additionally, for designing and implementing an ERP system, it is highly need to have a blueprint of the actual implementation of the system which determines the high-level ERP implantation strategy and depicts the information flow within the organization's subsystems and their interrelationship. [10-11]

This research talks about ERP systems associated with SMEs with the following formulated objectives: (1) To discuss the positive characteristics associated with the ERP systems in SMEs in able to cater the needs of garments manufacturing industry; (2) To design and propose an ERP framework in favor of SME community; and (3) To design the prototype of the framework.

METHODOLOGY

Human-centered design methodology was used in the study as the main method. Human-centered design is both a methodology and a mindset. As a methodology, it gives people the tools to create innovative and practical solutions to complex problems. As a mindset, it encourages would-be designers to identify with the people with the end goal of emphasizing the importance of research and collaboration. [10] Human-centered approach has 3 phases: (1) Inspire; (2) Ideate; (3) Implement as shown in figure 1. In inspire phase, in-depth interview was conducted to gather the needed data from the garments industry specifically from the managers, workers, and other persons involved in the proposed project. In ideate phase, the data gathered were analyzed and

translated into a solution. As main solution, framework design of X Apparel ERP system was created. To support this and for broader understanding, generic architectural design for ERP System in SME community was illustrated. Moreover, nonsystematic reviews of related literatures were performed. This research technique is significant for the development of framework design for X Apparel ERP System as it serves as basis and the concepts support the proposed framework design. In implementation phase, the framework design was delivered to the Apparel Industry. Additionally, prototype of the ERP system was exemplified to provide a big picture of further implementation of a project. Risk management plan can also be formulated to identify the potential risks of the proposed project, estimate the impact and the probability of each risk and determine the contingencies.
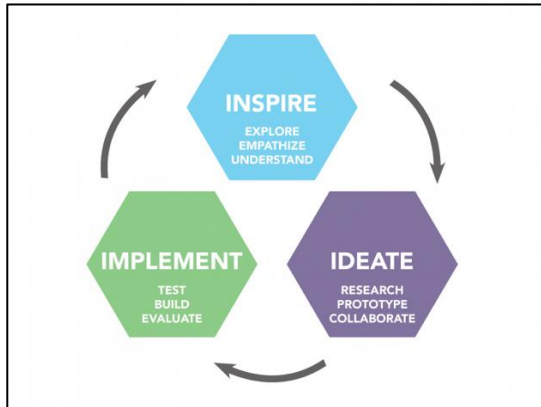

Figure 1. Human-centered Design Model, from Waggoner, A (2021)

RESULTS AND DISCUSSIONS

As many businesses benefit from ERP systems, they improved the efficiency of business by unifying and protecting the data, automating processes, and generating simple reports. There have been many articles about the advantages of ERP systems and truthfully, a lot of enterprises especially SMEs have been appropriately benefitted. The positive characteristics of ERP systems in an enterprise and SMEs make everyday activities and planning more effective.

Positive Characteristics Associated with ERP systems for SMEs

From the methodology that have carried out by the researchers, related data and researches were gathered. With that, these are some, if not all, the positive outcomes of ERP for SMEs: (1) Data entry errors can be reduced especially if the data does not have to be inputted into the system. Alongside with this is the cost reduction which can be realized as redundant steps are disregarded, eliminating too much paper documents while reducing manual labor of inventory; (2) An increased operational efficiency can be noted as the traditional paper documents shall be replaced by electronic copies. This may impose the ability to compete and battle beside bigger companies and enterprises. An ERP can help reduce the time and effort taken by the employees to complete their daily tasks, in addition to lowering IT and training costs. An ERP solution, when properly implemented, can significantly minimize or eliminate repetitive manual procedures. This technically allows team members to concentrate on revenue-generating activities; (3) In using ERP, there are better insight which is a big benefit of ERP software. Implementing an ERP suite across divisions, there is a single, centralized reporting framework for all of the processes. An ERP framework can easily produce valuable reports and analytics at any time because it has a single source of authenticity; (4) The framework can help with the implementation and application of industry best-practice processes, ensuring that all activities are coordinated around the organization; and (5) ERP software enables small and medium-sized businesses to respond quickly to customer inquiries and reviews. As a result, integrating a CRM solution will assist SMEs in improving responsiveness.

Proposed ERP framework for SME Community
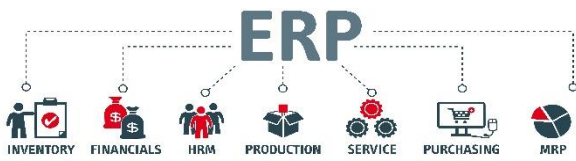
Figure 2. ERP for SMEs

Figure 2 shows the essential features of ERP software for small businesses. ERP software is a powerful data management tool that allows small businesses to access and exchange data, automating and streamlining critical business processes. Thus, ERP is an information system that integrates all facets of a company, including planning, buying, manufacturing, sales and delivery, customer service, and accounting.

From there, a proposed framework was designed for X Apparel Enterprise. The features were carefully selected to be able to address the problems of the end user. Figure 3 shows the proposed system architectural design for SME community particularly the X Apparel Enterprise.
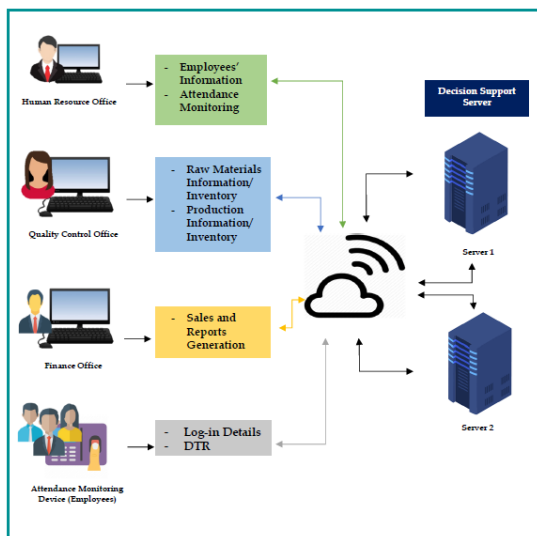
Figure 3. System Architectural Design

To efficiently manage the resources of X Apparel enterprise, a structure must be followed, as well as a system for a group of

components to work together against a common objective. Alongside the methodology that have undertaken, the researchers came up with a framework that is specifically designed for the X Apparel Enterprise and can be used by SMEs as well with the help of the observations and gathered data and researches.

The framework is an example of an enterprise with more than one branches. Specifically, there were three important modules that were adopted: the human resource management (HRM), the production and inventory and the finance management.

X Apparel has noted to have some troubles in monitoring the attendance of the employees. With that, the HRM is capable of managing the employees' information as well as monitoring of their attendance. Figure It is an important function of HRM which supports planning, controlling and management of processes of human resource. ERP implementation in human resource management raises the success rate and improves the whole management level of enterprises.

The Quality Control organizes raw materials information and distribution and regulates the information regarding products and inventory. One main problem of X Apparel Enterprise is the raw materials and product inventory. The proposed framework inventory management ensures consistency, proper reordering, and sufficient use. It allows for the development of inspection plans and checklists, the embedding of indicators of agreed values, the preparation of material specifications, and the portable recording of statuses and test results with quality control.

To be able to help the end user in managing finances, the proposed framework finance management is the one responsible for the sales and report generation. Accounting and financial reporting activities can be handled seamlessly with finance management. It can handle expenses such as expense

reporting and invoicing in addition to keeping regular account records. Advanced monitoring tasks such as profitability analysis and sales management may also be performed with it.

The Prototype of the ERP System Framework

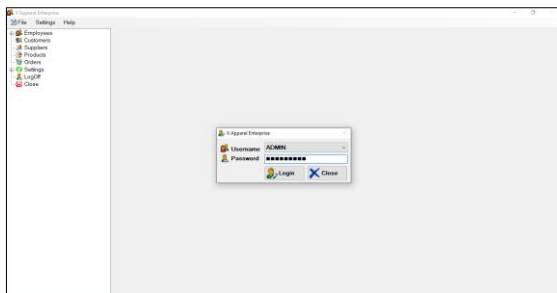The figures below represents the prototype of the ERP system framework.

Figure 4. Log-in

Figure 4 ensures the security of the proposed system. Once a user will log-in, a username and password will be asked.
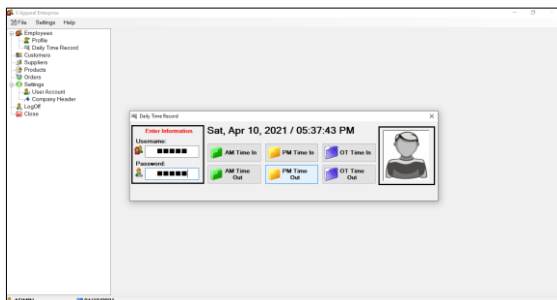

Figure 5.Attendance Monitoring

Figure 5 is where employees will log their time-in and time-out which guarantees the monitoring of their attendances every time they go to work.

Figure 6. Employees Records

Figure 6 presents the list of all employees which can be modified only by HRM and that cannot be deleted.
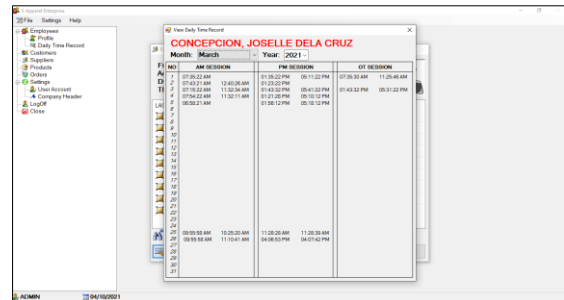

Figure 7. Time Attendance Monitoring

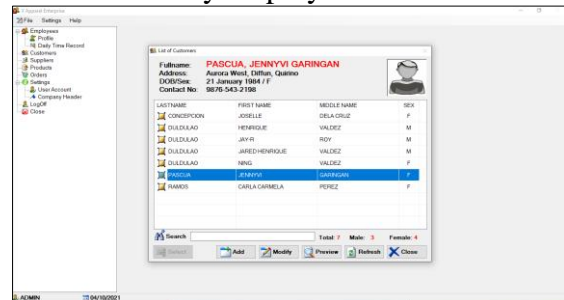Figure 7 displays the log of time-in and out of every employee.

Figure 8. Customers

Figure 8 displays the list of all customers, proving just the needed information to address the data privacy of the customers.
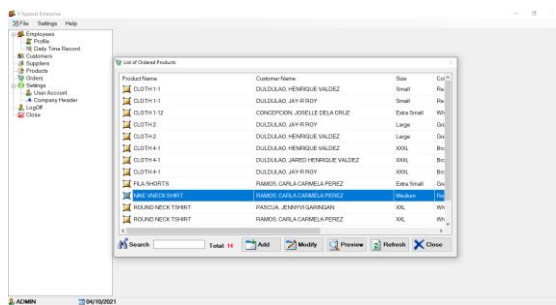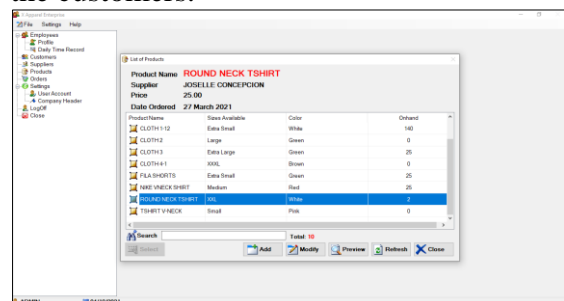

Figure 9. Products

As part of the inventory, Figure 9 presents the list of all the products including important data such as color, size and the number of stocks on-hand.

Figure 10. Orders

Figure 10 exhibits the list of all ordered products, the name of the customer, quantity cost, and the total cost of the orders to help convey the finance management under production. This also confirms the number of products ordered and how many are left in the stocks.

CONCLUSION

This paper contributes to both research and human centered design methodology finally providing a comprehensive framework for the effective management of SMEs especially for garments manufacturing. The two objectives were to discuss all positive and delicate characteristics associated with ERP systems while designing an SME framework to cater the needs of garments manufacturing industry; propose an ERP framework in favor of SME community; and to design the prototype of the framework.

The noted positive outcomes of ERP for SMEs are reduced data entry errors and cost reduction. Increased operational efficiency can also be observed when properly implemented along with better insights. The proposed framework was designed to provide solutions to the problems encountered by X Apparel Enterprise specifically the HRM, Inventory and Finance Management for SMEs. The prototype was designed to support the framework which attempts to deliver certainty that the proposed framework for X Apparel Enterprise could help in solving their existing problems.

REFERENCES

Leonardo, Jeff and Andry, Johanes Fernandes(2019). Design Enterprise Architecture for Industry of Textile Using Zachman Frameworkd oi:10.21917/ijms.2019.0140,June 2019

Maligat,DE (2019). Customizing Academic Knowledge Management System Architecture Framework based on Enterprise Architecture, IOP Conference Series: Materials Science and Engineering, Volume803, International Conference on Information Technology and Digital Applications 2019 (ICITDA2019), Yogyakarta, Indonesia

Bigueras, Rosemarie(2019). Design of Mobile Game-Based Learning Application for Children with Dyslexia. International Journal of Advanced Trends in Computer Science and Engineering. 9.322-326.10.30534/ijatcse/2019/4991.3

Istanbul Chamber Industry. December 2012. Garment Manufacturing Industry. Retrieved from https://www.iso.org.tr/sites/1/uplo ad/files/Garment_Manufacturing_ Industry_EN-685.pdf

New Cloth Market (July 2012). Philippines Garment Industry on the Growth Path. Retrieved from https://www.fibre2fashion.com/in dustry-article/6409/philippines-garment-industry-on-the-growth-path

Textile School (March 2019). Garments Production Process. Retrieved

from
https://www.textileschool.com/19
3/garment-production-
process/#:~:text=Garment%20pro
duction%20is%20an%20organize
d,raw%20materials%20into%20fi
nished%20products

Fibre2Faschion (2019).Sales and
Operations Planning for Textile &
Apparel Industries. Retrieved
from
https://www.fibre2fashion.com/in
dustry-article/4333/sales-and-
operations-planning-for-textile-
apparel-industries

Larry Lapide, Sales and Operations
Planning Part III A Diagnostic
Model, The Journal of Business
Forecasting, Spring
2005, &sec=article&uinfo=<%=s
erver.URLEncode(2094)%>"
target="_blank">http://ctl.mit.edu

Donald H. Sheldon, World class Sales and
Operations
Planning, http://books.google.con

Amini, Mohammad & Abukari, Arnold
(2019). Erp Systems Architecture
For The Modern Age: A Review
Of The State Of The Art
Technologies. Vol. 1. DO -
10.22034/jaisis.2019.232506.100
9

Lee, H.Y., Wang, N.J. (2019). Cloud-based
Enterprise Resource Planning with
Elastic Model-View-Controller
Architecture for Internet
Realization. Computer Standards
and Interface, 64.

Arachchi, SM. et al. (2015). Quality
Assurance and Quality Control in
ERP Systems Implementation.
American Scientific Research
Journal for Engineering,

Technology, and Sciences
(ASRJETS)