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New Approach in E-Business Redesign Process

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Abstract: This paper examines the interrelationship between two analytical techniques relevant in the organizational technological advancements, and the influence of these techniques on the company's performance. These analytical techniques constitute comprehending the organization's business processes and introducing e-business to its processes. I extract the model of the procurement process of Incomegypt to hypothesize that developing e-business is highly affected by process automation. The first technique – Ould's model –details the activities of the procurement process to deploy process automation that enforces the introduction of e-business. The second technique – Earl's model – enables the firm to assess the company's current stage of development over six stages.

Moving to the next stage of development necessitates internal diagnosis and automation of the business process using Role Activity Diagramming (RAD) – Ould's model. I hypothesize that process analysis influences process automation directly and utterly mediates the relationship between automation and e-business transformation. The research model is tested using data from interviews with a large number of employees and managers, observation and document analysis. The results provide strong support for the proposed research model. Thus, the analysis of the procurement process using RAD establishes a solid foundation for automating the company's processes, while also Earl's technique is used to assess the development of e-business in the organization; both techniques reinforce and complement each other.

Keywords: *E-business, Riva model, Business process analysis, process redesign, stages of e-business development, e-procurement, and process improvement*

Introduction

Business process analysis as a great impact on how the risk in a company could be calculated (Kochetova-Kozloski, M. Kozloski and F. Messier, 2013). IncomEgypt - a manufacturing company – is selected in this research to examine the development of e-business on the procurement process as one of the most important processes that occurs at the early stages of manufacturing.

Logistical processes control the flow of materials and products throughout the organization to fulfil customers' orders. The sales process is initiated by an order received from a customer to start the planning of production; it usually begins by purchasing

materials to start manufacturing, while also other logistical processes follow. Delaying any process causes delays in the proceeding processes (Daniela and Ovidiu, 2014).
E-commerce had seen rapid growth between years 1990s and 2000 that was followed by growth in sales and profit in 2003. E-business is considerably broader than e-commerce; it refers to all business processes being conducted online. The rise of Dot Com (Raven and Fleenor, 2002) refers to business being operated online encompassing nine models of business among which B2B is the foremost focus in this study.

B2B entails online transactions conducted between businesses; therefore, it mainly focuses on the procurement process. Doing business online could be categorized into three ranks; activity that refers to an individual task being performed by an employee, transaction that is wider in scope than activity and can encompass more than one activity, and processes-the widest scope-which involves both activities and transactions (Schneider,2012).
Organizations handling B2B transactions deal with greater amounts of money per transaction than those inB2C; therefore, they need secure methods of payment that ensure safety of confidential information submitted online (Haag and Cumming, 2013) like Electronic Fund Transfer (EFT) and Electronic Data Interchange (EDI).

Inventory management and information management

Traditionally, production was standardized in large volumes, organizations used to plan and manage inventory and hence being reactive (Haag and Cummings, 2013). The introduction of new ways of doing business in e-business transforms production strategies from being reactive to pro-active, by creating a demand-driven supply chain. In the reactive strategy, the production plan is constructed on the production forecast, so that production takes place first and is then 'pushed' to the market. In the pro-active strategy, the production process is triggered by orders, so the production is 'pulled' by customers. A pull-based model leads to better customer service with more customized products at lower costs.
Information visibility and sharing across partners of the supply chain assists the exchange of information online. Products can be visible across the length of the supply chain, so that delays at any stage could be observed and deviations could be instantaneously corrected. The online transfer of information is one of the reasons that facilitate order customization, where customers place orders first, and then they go through predefined processes until they are ready for delivery. Organizations are now shifting towards mass customization to eliminate inventory, thus triggering just-in-time production or make-to-order. Accordingly, information needs to be treated as a precious resource to generate customer satisfaction (Turban, 2006).
To process an order, information needs to move around the organization in all directions as well as with the external environment. Based on the direction of information, the type and size of information vary (Haag and Cumming, 2013) according to the level of management for decision making. The higher the level of management, the more summarized the reports needed and vice versa. For that reason, automating business processes entail the presence of information systems that route, organize and store information to be available online (out flow) and to gather information about customers and their orders (in flow).

E-supply chain and information flow

Ostensibly, the three key phases of the production network, acquisition, creation and dispersion, have been overseen autonomously, cradled by huge inventories. Business sector globalization is constraining firms from creating supply chains that can rapidly react to client needs. To stay aggressive, these organizations must decrease working expenses while ceaselessly enhancing client administration. With late advances in correspondences and data engineering, and additionally a quickly becoming cluster of logistics alternatives, firms have a chance to decrease working expenses by facilitating the arranging of these stages (Thomas and Griffin, 1996). Improper materials forecasts arise when distorted information passes from the sender to the receiver especially in long chains, thus ending up in surplus or shortage in inventory. Organizations are endeavouring to discover approaches to boost their adaptability and responsiveness and thusly intensity by changing their operations methodology, routines and advances that incorporate the execution of SCM ideal model and data engineering (IT). In e-supply chain all the parties work together collaboratively, reducing errors, time and uncertainty (Schneider, 2012).

The Procurement process

The purchasing process passes through several stages from the time a need arises until the product arrives to the company. The purchaser could be an individual or an organization. The purchasing behavior of an organization is much more complicated than that of an individual. Individuals buy to satisfy a personal need that is derived by their emotions where the decision is their own preference. When the purchaser is an organization, many persons are involved in the purchasing decision. The process takes a longer time because of the negotiations and interactions between different parties who want to avoid individual biasness and to arrive to a rational decision. Few orders are done in Business-to-Business but in large amounts of money (Weele, 2014).
The purchasing process involves the following activities:

1- Identifying the needs and the specifications. This imposes specifying the functionalities and technicalities of the product purchased and determining the activities required by the supplier. Technical specifications are written or drawn in technically to clarify the activities required by the supplier.
2- Selecting suppliers: This includes several steps that are triggered by the specifications in the previous phase. First, the method of subcontracting is determined; second suppliers are subject to preliminary qualification in order to extract the bidders' list. Third, the request for quotation is prepared and the received bids are analyzed. Fourth the supplier is selected.
3- Preparing the contract agreement and its terms. There are several types of contracts used to set up an agreement upon the price and other terms between the organization and the supplier. In this step the contract type that determines how the price will be calculated is selected. In some contracts the price is fixed and contracted for a fixed period, while in others the price is cost-plus with a percentage fee- a fixed fee or a maximum fee. Others are cost-reimbursable contracts based on an hourly labor and

equipment rates or agreements with price adjustment that is for long-term delivery where the price could be adjusted according to changes in the market or the currency. Besides, the terms of payment are specified in this step, and they are mainly based on the type of product delivered and the supplier performance.

4- The ordering process and expediting. In case of routine buying, the order is placed against a call-off agreement that is initiated electronically or manually through purchase order requisition. In manufacturing companies where their main purchases encompass materials and dealing with inventory for production, the MRP system is employed to designate the quantities required, passing them to the purchasing department by means of a purchase order requisition that is turned to a purchase order electronically or manually in some cases. The supplier is requested to send confirmation for each purchase order. While the product is being processed, the buyer expedites the order by either one of three methods. The first is the 'exception expediting' method where the buyer waits for the deadline of sending the materials, but they are not sent on time. In this case, he contacts the supplier. This is not recommended as the buyer starts an action after-the-fact. Secondly, the 'routine status check' is much better in that the buyer contacts the customer few days before delivery to ensure that delivery will be done on time as agreed. The third method is the 'advanced status check' where the order progress at the supplier's side is checked on a regular basis from the buyer's side.On arrival, the delivered product is checked to ensure that the requirements are met by applying an acceptance test either at the supplier's side before delivery, or at the buyer's side after delivery or both.

5- Evaluation is done to assess, evaluate and rate suppliers. It is important that the buyer always documents and keeps track of the supplier's quality, competitiveness and innovativeness. Such data helps later on in rating vendors. This, in turn, participates in the assembly of the bidders' shortlist, and therefore, the company works only with suppliers who had demonstrated best performance. This also has a positive impact on the internal operations and production processes in the company because it helps avoid poor quality products and delays in delivery.

E-procurement

E-procurement is a way of going through all the purchasing activities online including exchange of information and transaction processing (Weele, 2014). There are three ways for e-procurement: electronic market places where businesses meet on the Internet to sell and buy online, electronic auctions, the most common way whereby bidders publicly announce bids online until the desired price is reached, and order-to-pay which is the way of managing the whole purchasing process activities starting by requisition, order, delivery and payment (Schneider, 2012).

In this research, the procurement process in IncomEgypt is analysed, modelled and then compared to the standard activities of the procurement process previously mentioned in the literature. The model details the process to enhance the understanding of its activities,

reveal anomalies if they exist and recommend improvements as a preparatory stage for automation.

Stages of Developing E-business

E-business and e-government are two recently used terms. Their existence was accompanied by the development of the Internet and the technologies related to it. The growth and development of electronic applications done over time are presented on phases. Earl (2000) explained the evolution of e-business as occurring in six phases. In the first phase only the organization decides to have a home page, present information about itself and have an e-mail that facilitates the communication with the outside corporations. During this stage, the company uses partial Internet features.

In the second stage, the main aim is to allow internal communication to transpire electronically. The IT department plays an important role in connecting the organizational departments together and also connecting the organization with the external community by building Intranets and Extranets.

Stage three is the debut of the term e-commerce. During this stage, organizations start doing transactions online. It takes them some time until the new technology and its functionality sink in. Organizations in this stage focus on the technology and the infrastructure that supports the online exchange of business documents.

Moving to stage four introduces new ways of selling and buying online that require modifications in the structure of the business and its processes. Accordingly, business process improvement and re-engineering take place to accommodate the organization in the new form of business.

The newly restructured and introduced business processes need to be well managed which, in turn, requires the utilization of information. The quality of information has an impact on the internal and external processes (Haag and Cumming, 2013). The information is treated as a resource to the business that is used in tracking transactions by passing it among employees and managers to help in decision making. Therefore, it should be timely, precise and accurate. Also, employees who are information-literate should be selected as they will be creators and users of the new system.

By reaching stage six, the organization has already assessed all the requirements of e-business and become fitted in it. In this stage, the environment becomes more relaxing by using technology routinely until the organization merges with the dynamic environment while incessantly developing and enhancing the technology.

Process Modelling

Business processes and their interconnections can be seen better by pulling them out in a process model. In displaying methods, it is imperative to choose a suitable one (Stankevičius & Vasilecas, 2014). A method that connects business process modeling to implementation broadens the scope for correspondence between distinctive parties included in a process. Business modelling is troublesome as a result of the unpredictability of business. The stream of work in any business is dynamic and unverifiable. A methodology model gives a hierarchical deliberation with which hidden designs in the business could be pictured out for improvement (Kohlbacher, 2013).

Process modelling can be utilized to break related business processes down into little actions comprised of activities and roles. The demonstrated methods can then be dissected and may be progressed. New processes can be outlined and old ones changed.

With the backing of business process management software, processes can be enacted to wind up genuine techniques in the organization (Ould, 2005).

An outline of the Riva technique

The Riva method of business process modelling is business-oriented as opposed to programming-focused for it concentrates on the administration of business elements through the activities and associations of distinctive parts, as opposed to reducing the whole processes of business to merely a theoretical rationale. The method combines two forms of diagramming, process architecture diagramming (PAD) and role activity diagramming (RAD). A process architecture diagram shows several or all of the business processes in an organization, and how they relate to one another. A role activity diagram shows, for a single process, the activities within roles and the interactions between them. In this paper, I will develop the role activity diagram for the procurement process to illustrate the internal structure of the process.

In process architecture diagramming, the objective is to find and draw those processes which act on key objects or entities that the organization must deal with. These objects called Essential Business Entities (EBEs). An EBE could be a product or service provided by the organization, an internal or external customer, or it could merely be things the organization has to deal with on a daily basis, or otherwise 'cannot get away from'. Ould suggests that organizations in the same line of business have to deal with the same EBEs.

Organizations are also occupied with objects that are not fundamental to the business, but rather arise out of the way an organization chooses to do its business which he calls Designed Business Entities (DBEs). These may differ vastly between organizations in the same line of business. Business entities (whether essential or designed) become units of work for an organization, according to the Riva method, when they are tracked and followed from the time they arrive in the organization till the time they leave. A unit of work (UOW) diagram shows how different units of work are involved with one another, or engender one another. Originating from the UOW diagram, each unit of work can then be treated as a case process within which roles, activities and interactions can be delineated in a role activity diagram.

At a higher level, the information flow and dynamic relationships between processes can be represented in a process architecture diagram. In addition to each unit of work being modelled as a case process, the flow of units of work through the organization also needs to be modelled, as a case management process. Case processes and case management processes, and the interactions between them, are modelled in the process architecture diagram. Once a process architecture diagram has been drawn for a business (or part of one) on the basis of the business entities it handles, it becomes possible to consider whether any improvement or streamlining of the business looks possible. The possibilities are that some processes could be enhanced, dropped, or reordered; some departments could be restructured; or some responsibilities could be reallocated. From this diagram, a RAD for a process could be detailed showing the internal structure of the process. Both diagrams permit a debate about change to commence. If sufficiently detailed, and given sufficient software support, the diagram could also serve as a basis for the enactment of new or changed processes in the organization.

IncomEgypt an overview

Egypt's industrial sector has undergone major reforms since 1991, showing clear steps towards privatizing and restructuring state-owned enterprises. This has led the way for private organizations such as IncomEgypt to launch their own business. IncomEgypt Company is a subsidiary of Incom (America) operating in the free Zone, Inc. that was first established in 1994. It is a manufacturer of custom wire, harness assemblies, flexible building cables, power supply cords and plastic spools. The company serves both the local and international markets.

IncomEgypt provides a wide range of products, some of which are wires, cables, wire harness assemblies, power supply cords, and plastic spools. IncomEgypt products are certified by Underwriters Laboratories (UL) and SASO and are strictly tested in compliance to their standards. Additional compliance testing is preformed where other certifications are required such as BS/IEC/CSA/VDE and CE. INCOM has a set of traditional and core activities, some of which are Sales, Research and Development, Prototyping, Assembly, Molding, Quality Control, and Technical recognitions.

The Purchasing process in IncomEgypt

The purchase request arrives to the purchasing department after confirming the sales order and passing it to the planning department. The planning department checks the availability of materials with the inventory department. In most cases materials purchased are sufficient to cover the sales order under consideration. Incom undergoes the importance of purchasing forecast, and consequently the manufacturing process takes longer time than usual. After the materials arrive, they are inspected by a representative from the purchasing department, quality control department, manufacturing department and inventory department who release a report that indicates the quantities and the status of the product signed by the aforementioned representatives. If defects are detected in the materials, they are returned to the supplier and the work order has to wait for the replacement materials to arrive or to order from another supplier. In fact, there is no sales forecast in IncomEgypt which is conducive to an unclear purchasing plan. IncomEgypt relies on international as well as local suppliers in obtaining its supplementary materials. However, the two main materials they rely on are Copper and PVC that are bought locally, in addition to other supplementary materials. One of the key reasons Incom cannot plan purchases is the Copper price - the main material for its production – that could hardly be forecasted as it is controlled by the stock market.

There is also another cause of the delays in processing sales orders which is document circulation. Documents are passed manually between departments. The MRP system that IncomEgypt relies on is insufficient to cover all the processes in the company; it only manipulates information related to materials. Based on the information fed to the system by the sales employee about the sales order, the bill of materials document is released, and then the materials in stock are checked by the planning department. The materials requested are then sent to the purchasing department to release the purchase order. The purchase decision is made by the purchasing department that indicates the quantities required and the supplier. The purchase order is released by the system, and then it is distributed manually to the other departments. Only two employees work on the MRP system: the sales manager and the purchasing manager. MRP is not connected to a network where both the sales and the purchasing employees use the same account to record their transactions. The Inventory management is done manually and so are the rest

of the processes. Many delays in the purchasing and sales orders are due to the lack of information communication between departments.

Analysing business processes for IncomEgypt

Building on the UOW diagram for Income Egypt from a previous paper (Fady and Abd El Aziz, 2012) the procurement process is selected to examine the flow of information, the flow of work in the process and the requirements needed to improve the process for automation. Based on the interviews undertaken with the employees and managers in IncomEgypt, the company suffered incremental losses over years ago. The data collected about the last three years demonstrates that sales have decreased by 35% in 2012, increased by 10% in 2013 and remained the same in 2014. I was able to lay hands on information about the company's business processes in general and the procurement process in specific. As a manufacturing company, the logistical processes in IncomEgypt play an important role since an order is received from the customer until the finished product is delivered. The manufacturing process is always preceded by other processes when the customer sends an order the sales department directs it to the Research and Development (R&D) where employees start investigating the design to customize a sample according to the order specification if it the first time to be ordered; otherwise it is sent directly to the planning department. The sample is produced and reviewed by the customer for approval, and then it is sent to the planning department. The planning department plans the materials and time required for production based on the delivery date, and then the work order is released. Six copies of the work order are distributed to the following departments: inventory, manufacturing, quality control, customs, accounting and shipping. The inventory department starts checking the required materials in stock. If the quantities required are not in stock an order is sent to the purchasing department to start its process by contacting suppliers and comparing offers. Purchasing orders are released and 2 copies are sent out. The first is dispatched to the customs to receive the shipment at the free zone gate and the other one to the accounting department. Once the materials arrive, they are checked by the quality control, purchasing and inventory departments to approve products. In case of incompatibility, they are not received and returned to the supplier; otherwise, they are added to the registry of the inventory. The materials are then taken to the production process for manufacturing and the finished products are tested by the QC, packed and delivered after the customs department has already prepared all the needed documents to release them out of the free zone.

Analysing the procurement process for IncomEgypt

The procurement process in Incom is examined in Figure 1; from the model, it is clear that the process in common matches the standard procurement process in the steps and activities. Needs and specifications are identified according to the functionality and technicality of the product. Suppliers are selected from an existing list of suppliers or otherwise a new supplier is assessed to be added to the list of suppliers. RFP is sent to the suppliers and the RFQ is received to select a supplier. A contract agreement which contains information about the order like prices, dates, and delivery terms is then prepared. IncomEgypt applies 'advanced status check' where the order is checked on a regular basis after it is placed. On arrival, the delivered product is examined by a representative from the purchasing, manufacturing, R&D and QC departments to approve the shipment. If the shipment is approved, it is taken to the warehouse; otherwise, it is

returned to the supplier who will be requested to change the materials. The order then is closed on MRP by the purchasing employee.
Incom does not perform supplier evaluation; the suppliers are not rated. It is only done verbally based on how the employees perceive it. Information integration is another problem; MRP is not shared among the company. The sales, purchasing and planning departments are the only participants; in addition, the software is not installed on a network environment. Only one computer runs the software and it is shared on that computer using the same account. Officials at IncomEgypt tried to buy a new ERP system twice, but they failed to do so because they failed to modify and improve their processes to fit in the new system. They were also unable to define the activities of each process in order to make this migration easy and understandable. For these reasons, it is obvious why the information is imprecise and delayed.

Determining the stage of e-business development in IncomEgypt

After analysing the procurement process in IncomEgypt, it was obvious that most of the activities are done manually. Comparing between Earl's six stages of development and the development in IncomEgypt, the company already has a website that presents information about its history, products, and contacts. All internal communication takes place either by e-mail or manually. The flow of information is limited compared to the size of its processes causing lots of errors in the processing of orders. IncomEgypt is still in the initial stage of development as there is neither Intranet nor Extranet to allow electronic communication to take place. All transactions (selling and buying) take place by e-mail and phone calls. Slight improvements in the internal communication were introduced in 2011, namely, buying a domain name, using Microsoft Outlook to manage e-mail accounts and developing a static website. The company also tried several times to buy ERP system to record, manage and organize transactions, but they were all futile due to the unavailability of the needed information. In 2012 new servers were put into operation and other preparations took place to introduce a new ERP system; however, the system was found deficient in some processes, and the information gathered was inaccurate and incomplete.

Determining e-procurement in IncomEgypt

IncomEgypt communicates with other companies (suppliers and buyers) by sending and receiving e-mails; no online system or VPN is used. The company did not participate either in electronic market places, electronic auctions/bids or online order, and all purchasing transactions take place by placing a phone call and sending an e-mail. Based on the above analysis, IncomEgypt is facing problems in automating its processes. In order for automation to take place, the company needs to have all the information needed to feed the system.
In order for IncomEgypt to enhance its performance and to maximize the profit, the following should be considered:

- Networking infrastructure needs to be well constructed; this could be done by the IT department. Though the company has an already installed physical network the network is not well established.
- The MRP needs to be replaced by a suitable ERP system that is appropriate for the organization and its employees.

- Each process needs to be detailed for analysis where required modification can take place for automation. IncomEgypt found it hard to automate its processes because they are unclear to the employees themselves as they used to perform them in a traditional way.
- It is important to review the flow of information when considering automation. The way information is delivered and viewed will differ; privacy policy is of a big concern also to ensure that only the intended person can view this information.
- Having the internal processes automated, it becomes easy to interact online with other organizations either in selling or buying. The company can place online transactions allowing the system to pass information electronically from and to the system once a purchase order is needed. Later on, online payment could be introduced by using Electronic Data Interchange (EDI).

Conclusion

It was found that though IncomEgypt uses MRP system to manage its inventory, the company still suffers lots of delays in the delivery of its orders because of delays in the procurement process. It was also found that after several trials, the company experienced difficulties to adopt ERP systems due to imprecise information and employees' resistance. IncomEgypt is in need to upgrade its processes for better performance and profit maximization by introducing new technical solutions that will automate its processes to allow online interaction with its partners on the Supply Chain. IncomEgypt is not doing business online due to several reasons the most important of which is the employees' resistance to use technology because they are unfamiliar with the new way of doing the process. Moreover, the lack of accurate and complete information constitutes a major problem to automate the business processes internally that also impedes the existence of the organization online. Managers in IncomEgypt are not able to make right decisions as it takes a long time to find the information needed and accordingly, were not able to decide about the suitable ERP system.

Using both techniques - Ould's Riva method and Earl's model - the processes of the company could be examined for better understanding, the needs and requirements for process automation could be identified and system integration could be applied to allow one single point of access. From Ould's model, I was able to examine detailed activities in the procurement process to disclose defects and complexities that need improvements. Using Earl's model, the stages of E-business development were examined at IncomEgypt. The company's stage of development was identified and then the requirements to arrive to the sixth stage of development were determined. From the analysis, it was clear that the company is still in the primal stages of development making it hard for it to compete globally.

For an organization that aims to operate its logistical processes online, it has to follow the six stages of e-business development. However, complications arise when the organization goes through the stages without clearly identifying the internal requirements to support its online existence. First, the internal processes need to be analysed to depict the current detailed activities within each process and to represent the information flow

between processes, and then it needs to be compared to the formal structure of each process.

Both Ould's and Earl's techniques integrate each other. The RAD model details the process for analysis and improvement by restructuring and modifying the processes and the stages of e-business moves step by step towards the fully automated online system. This technique could be generalized on the rest of the company's processes. In addition, other organizations can rely on it to make the transition to e-business. In the future, more studies could be applied on automated decision making. Processes could be analysed to examine the possibility of automating decision making in the process.

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