Business Process Reengineering of Supply Field in Iran Office Machines Industries

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Abstract

Nowadays, the development of Information & communication technologies are considered as one of the main indicators of measuring the level of firms’ development & growth which result in offering various services, creating job, creating new businesses, improving productivity & such as. Organizing & expanding the ICT services with the competitive & facilitator approach which is caused to customer attraction, customer retain & increment in their loyalty as well as increment in productivity is settled in these firms’ plans & need to the recognition of relationship between customer & personnel wants & the quality of presented services by the organization. The aim of this research is supply process reengineering in Iran office machines industries which has been done through using APQC, the processes classification pattern & framework in the organization & Alec Sharp methodology. Statistical population includes employees of Iran office machines industries out of whom, 64 persons have been selected as sample. Data have been collected by author-synthesized questionnaire that is a questionnaire composing of 22 items have been used to evaluate software quality dimensions and another questionnaire including 28 items has been used to measure software satisfaction; the reliability and validity of the questionnaire have been confirmed. Data have been analyzed using correlation coefficient by SPSS and Excel software. The outputs of the abovementioned software have been for statistical analysis. The results have indicated that supply process reengineering & establishing new process have significant gap with comparison of quality dimensions & acceleration in supply process in current situation.

Keywords: Business Process Reengineering, Inventory Control, Good Supply, Enabler.
1. Introduction

There are revolutionary changes & trends all over the world in which the current duties of the organizations has replaced with the main processes of the business and the organization is moving from duty-orientation condition towards process-orientation ones. This will result in the acceleration of business trend & decrement in costs as well as organizations’ becoming more competitive & increasing their productivity. (Ahmadi, 2013; 39). Each organization or firm is a social entity which is aim-oriented as well as has harmonic & active systems. By passing times, organizations all over the world have understood that only the gradual changes can’t solve their current problems; sometimes, there is need to fundamental & essential changes for organization survival. To do that & to increase productivity, business process reengineering can be used. Business process reengineering means redesigning the works doing processes in the organization.

1.1 Business process

A business process is a series of related activities which are started in response to a starter event and result in a determinant &discrete outcome for customers & process applicants. (Gholipour, 2013; 86). The process is a method for organizing works & resources (individuals, equipment, information, etc.) in order to achieve aims. In the past, organizations organized their works & resources in the form of expertise or function. Nowadays, organizations organize the resources in the form of functions, too; but, they organize the works in a way to achieve to an output-outcome for the customers. This is process-orientation which results in below definition; the process is a definite arrangement of work activities base on time & place with clear start & end and input & output identification as well as a structure for doing. (Wikipedia)

1.2 The process classification pattern & framework in the organization

The process classification & framework which has been presented by the productivity & quality center of America and has been introduced for the first time in 1996. This framework which has been achieved through investigating & patterning from hundreds of top global organizations & has been updated several times until now, is one of the models for existing process reference in the management world in which it has been tried to identify the whole existing process of the organization to the extent of activity or even duty level. It can be said that this model is one of the best frameworks which helps organizations to identify the needed processes for value creation for the customer & to act in order to achieve this according to the industries they act in. This model presents whole processes of the manufacturing – service organizations in 5 steps; process categories, process groups, process, activity & duty.

Process categories such as customer service management, financial resources management or human resources management is the highest step of the processes in the organization. Process groups such as after sale service, logistics, payable accounts & personnel recruitment are the next step of organizational processes. The process is on the next step. The processes are a series of related activities which give results & output instead of input & resources. The processes performance is continuously being investigated by the standards of management control systems in the organization.
The next step is the activities. Activities are the events & occurrences which happen during performing of a process. Receiving the customer request & solving his/her complaints or negotiating about the purchase contracts are some examples of these activities.

The last step, the duties, is the step after hierarchal analysis & activities. It is possible that the activities be different in various industries widely. Such as, creating the business & obtaining the budget & formalizing the designation & bonus way.

1.3 The Alec sharp methodology
In the related activities to consultation of information systems, most of services are done due to problem outbreak in doing projects; these problems must be identified & solved. This indicates that individual doesn’t have the necessary guidance for avoidance from these problems. This has become common to extent that Alec sharp has hold a conference on “orientation to process- the issue which has been forgotten by the experts.” The aim of the conference has been remaindering this fact that the experts of business processes ignore facing with existing problems in work fields.

In applying IT in this firm, the construction of origin approach & reengineering process method through using workflow designation which is one of enabler tools for reengineering have been used. In old workflow model, the activities did manually & through excel software & the extraction of the information was taken weeks. Now, the extraction of information is done in few minutes due to the improvement of activities. As a result, on one side, the production continuity is kept; one the other side, the storing raw material more than need is prevented.

1.4 Supply chain
It is about three decades that the supply chain issue has been introduced. Generally, the supply chain protects all organizations & members that are involved in supply from raw material supply to value creation for the end user. The main aim of supply chain is to give the good or services to customer in best way as well as what we know as the value in supply chain space has two state, it is possible that the main issue is money; therefore, the presented issues are; how much ability does the supply chain has had to give good or services to the customer in good price & condition? In this stage, to be responsive is important, too. In some cases, such as emergency condition the speed is important for us. In this condition, the service supply chain must answer very soon.

2. Research theoretical background

2.1 Research background
Considerable tension has been arisen between the reengineering communities & Kaizen (fundamental redesigning or TQM) through the arrival of reengineering. The doers of reengineering were surprised that why their colleagues in Kaizen-oriented groups improve the processes which should be leave away & consider the doers of reengineering destroyer & hasty. Eventually, these two groups have put along with each other through improving process-orientation or process management with knowing that reengineering is a process which happens once & its improvement (Kaizen) is done for ever (Gholipour, 2013; 48). According to the
followers of this theory, the lack of flexibility in organizational structures & complexity of methods in the organizations which date back to 1960 result in IT inefficiency in development of organization performance. The old design of organizations is a barrier & most of the times a complex chaos. In fact, the Information systems are unable to affect organizations or increase their efficiency. (Tajfar, 2015).

There is no done research in the field of business reengineering through identifying, assessing, designing & installing the process by using business reengineering as well as using the APQC process model in Iran. Most of the done researches are in the field of reengineering techniques & patterns; also, this issue has been investigated and there isn’t any system which has been designed & installed according to the needs of organization. Thus, the current issue is new in Iran &it is notable because presents a model which is installed & tested based on the organization needs & inside the organization. Some related researches have been presented below;

In a research by the general art & cultural bureau of education ministry as ‘reengineering students’ uniform & coping with increasing trend of women bad wearing as well as fostering Iranian wearing among the students” has tried to reengineer students’ wearing who must be present by a kind of uniform, with the integration of local & traditional clothes and requirements of Hijab and Islamic dress so that students could meet the related interests & mental needs of their age & education as well as could voluntarily preserve their Hijab & wearing.

In another research as “determining the reengineering pattern for good & material requirement planning in National Iranian South Oil Company through investigating the performance of firm logistics unit” Hamidizadeh & Monjazi have evaluated the reengineering pattern of applying material planning system in the mentioned companies to decrease ahead problems a bit.

In another paper, the business process reengineering for KM-oriented construction companies has been investigated by Chen & Huang. This study has explained the development of a model made through combination of knowledge management with business process reengineering as well as besides improving the weakness of complex processes in construction companies, explains the integrated model of KM merging in normal trend operation; finally, investigates the business competition & innovation fostering in the company.

2.2 The existing problems in work field
1. From the first stages of the project, an incorrect body of work is considered as a business process. This can be part of a process activity.
2. The existing complexities in a multipurpose business process aren’t covered.
3. When team does the existing process modeling, it has involved itself in construction hard details & neglects from important parts.
4. The business processes & information systems are being treated as two different worlds.
5. Evaluating the existing process & designing the desired process lacks a holistic attitude (Tajfar & Parhizgar, 2015).
3. Research methodology
3.1 Research hypotheses
3.1.1 Research main hypothesis
There is significant difference (gap) between the dimensions of the supply business process reengineering quality in current condition & desired condition.

3.1.2 Research subsidiary hypotheses
✓ There is relationship between the speed & precision dimension of systemic software in supply reengineering with the dimensions of satisfactory.
✓ There is relationship between ease of usage dimension of software in supply reengineering with the dimensions of satisfactory.
✓ There is relationship between the reliability dimension of software in supply reengineering with the dimensions of satisfactory.
✓ There is relationship between security & validity dimension of software in supply reengineering with the dimensions of satisfactory.
✓ There is relationship between condition improvement dimension in supply reengineering with the dimensions of satisfactory.

3.2 Conceptual model
3.2.1 Process design performing way with APQC
The main steps of organization processes designating & providing according to AQPC PCF reference model has been illustrated in figure (1).

Fig. 1: the main steps of organization process designation by APQCModel

Recognizing the existing situation

Analyzing the existing situation & extracting the requirements of desired situation

Providing the desired process model

Gap analysis & providing the operational plans for performing processes
Although, the APQC process model is a suitable model for helping to process identification & designation; but it should not be forgotten that this is only a model & pattern and should not be changed to a lifeless stereotype. Model & pattern means an outstanding sample which lets a skill to be created during doing a work through inspiring from it or simulating it. Such as a pattern which is written by a teacher or an outstanding and talented calligrapher or like a part which is played for his/her student by a music master. Learner or student repeats them to become skilled in them. Pattern helps us to learn how to do a work & learn it. But, it doesn’t want us to write or play the same things. Pattern teaches how to learn not writing something. The classification of business model for APQC has been illustrated in figure 2.

3.2.2 Execution of Alec Sharp data flow graphs
In order to improve its efficiency and effectiveness, the process has been organized at three phases as follows:
1. Phase one: setting the frame, range and aims
2. Phase two: understanding the current process
3. Phase three: designing ideal process
Path movement graphs have the highest popularity among various methods developed for drawing business processes. Popularity of movement path is due to the fact that they are easily understood. These graphs represent process variables-who, how, when- in the form of simple symbols not requiring education. Since movement path depicts the participants of the process in a particular form, high level of participation is provided and this property justifies superiority of these graphs over other process modeling methods (Gholipour, 2013: 24).

3.3 Methodology
Statistical population includes employees of Iran office machines industries out of whom, 64 persons have been selected as sample. Data have been collected by author-synthesized questionnaire that is a questionnaire composing of 22 items have been used to evaluate software quality dimensions and another questionnaire including 28 items has been used to measure software satisfaction; the reliability and validity of the questionnaire have been confirmed. Data have been analyzed using correlation coefficient by SPSS and Excel software. The outputs of the abovementioned software have been for statistical analysis.

4. Data analysis
4.1 Analyzing the AQPC PCF reference model
The main steps of designing and setting organizational processes have been performed based on the reference model AQPC PCF; the expected outputs of the proposed design are presented in table 1.

<table>
<thead>
<tr>
<th>Reports</th>
<th>Process output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification of the current status</td>
<td>Organization process model, hierarchical process model, ID of process at current status, information formats of the organization at current status, problems and hurdles of current processes, requirements of ideal process status</td>
</tr>
<tr>
<td>Analyzing the current status and extracting the requirement of the ideal status</td>
<td>Problems list, requirements, general requirements of organization in the field of process and information</td>
</tr>
<tr>
<td>Identification of ideal status</td>
<td>Organization process model, hierarchical process model, ID of process at ideal processes, information formats of the organization at ideal status, relationship map of the processes, measurement criteria and key factors of process success, determination of control points of the processes</td>
</tr>
<tr>
<td>Gap analysis and preparation of operational plan for process execution</td>
<td>Gap analysis of current and ideal statuses, execution of operational plan and establishment of the processes</td>
</tr>
</tbody>
</table>

Process levels of APQC model in five layers are presented in table 2.
### Table 2. Process levels of the reference model APQC

<table>
<thead>
<tr>
<th>Row</th>
<th>Layers</th>
<th>Process levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Classifications</td>
<td>Customer service management, supply chain, financial organization and human resource</td>
</tr>
<tr>
<td>2</td>
<td>Process groups</td>
<td>After sale repairmen, procurement, payments, employment/resource, development of sale strategy</td>
</tr>
<tr>
<td>3</td>
<td>processes</td>
<td>Processes of resource consumption and the need for standards for executing the repetitions and processes of responding to system control including quality, speed and performance cost</td>
</tr>
<tr>
<td>4</td>
<td>activities</td>
<td>Receiving customer’s request, resolving customer’s complaints, purchase contract</td>
</tr>
<tr>
<td>5</td>
<td>duty</td>
<td>Creating business case and obtaining budget, certifying the designing and reward method</td>
</tr>
</tbody>
</table>

### 4.2 Analysis of Alec Sharp model

#### Table 3. Evaluation of current and ideal status of the processes and the way of achieving them

<table>
<thead>
<tr>
<th>Row</th>
<th>Event</th>
<th>Current status</th>
<th>Ideal status</th>
<th>Empowerment tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Order request</td>
<td>Performed by business unit using excel files</td>
<td>Performed by Madiran information system software by business planning and supervision</td>
<td>Providing MIS software</td>
</tr>
<tr>
<td>2</td>
<td>BOM sending</td>
<td>Sent by supplier in the form of Excel file</td>
<td>Sent by supplier in the form of Excel file</td>
<td>Email</td>
</tr>
<tr>
<td>3</td>
<td>SBOM information</td>
<td>performed by customer satisfaction in the form of Excel file</td>
<td>Recorded in MIS software by product engineering to confirm technical properties of the product</td>
<td>Hamkaran System and MIS are integrated and MIS presents the changes of Hamkaran system</td>
</tr>
<tr>
<td>4</td>
<td>comparing SBOM with</td>
<td>Comparisons are made by quality control unit in an Excel file</td>
<td>MIS is compared with packing list by material planning unit in MIS; calculations are hidden for users</td>
<td>MIS changes are made to compare SBOM with packing list</td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td>5</td>
<td>Reporting differences among the items</td>
<td>Performed by material plan unit via store inventory of Hamkaran system and calculating need for items and receiving CKD remaining and calculating need for item or according to store inventory</td>
<td>Various models of the product are adopted by material planning unit or MIS and reported quickly</td>
<td>Required information is prepared by MIS software quickly</td>
</tr>
<tr>
<td>6</td>
<td>Confirming the report</td>
<td>Purchase request is sent by planning manager in the form of an Excel file</td>
<td>By planning manager in MIS software</td>
<td>In the case of repeated request, purchase request is sent in the form of MIS software</td>
</tr>
<tr>
<td>7</td>
<td>Attempt to send the product</td>
<td>By supplier or in accordance with product manager</td>
<td>By supplier or in accordance with product manager and planning unit</td>
<td>Payment is the duty of business unit. If the difference is related to packing list, the supplier won’t receive payment for sending the good; but if the difference is due to defect of firm’s processes, the cost of recurrent sending will be received.</td>
</tr>
<tr>
<td>8</td>
<td>Supply good</td>
<td>Receiving acknowledgement is announced by Email</td>
<td>Receiving acknowledgement is announced by Email</td>
<td>Email</td>
</tr>
</tbody>
</table>

**5. Conclusion**

Regarding the fact that for resolving the problems and reengineering of the business modern organizations need methods that comprehensively model their activates and improve their business processes and activities after identifying the weakness and strengths of their processes, such models should be general and categorize all activities of the organization. According to studies, it seems that the best pattern for classification of the organizational processes is that developed by USA quality and productivity center called processes classification framework. Formed based on hundreds of superior organizations across the world, this model classifies all processes of a product-service organization into five categories as process class, process groups, process, business activities and duties.
5.1 Results of evaluating software quality dimensions
By investigating quality dimensions of the software, the following results are obtained:
- Tangible factors of speed and accuracy: most of the sample members consider that speed and accuracy of performing the tasks are very good and self-confidence and satisfaction of employees are at good level.
- Work easiness: most of sample members think that reporting and decision making is good and easiness of updating the content is at moderate level.
- Reliability: most of the participants believe that sharing the information to other units, information security, information reliability and reduction of error percentage are at good level.

5.2 Results of evaluating dimensions of satisfaction with the software
By evaluating dimensions of satisfaction with the software, some results are obtained as follows:
- Satisfaction with the software: most of the sample members believe that using the software for duties, employees’ awareness about the services are very much and software responsiveness in the shortest time and lack of problem at the beginning of the work day so much good.
- Satisfaction with software efficiency: most of the participants believe that software support ability to answer the questions, sufficient awareness of the software support about the process to solve the users’ demands and users’ skills are at moderate level; while software effectiveness, consistency of software effectiveness, appearance of the software and accurate storage of the data are at good level.

5.3 Comparing old and ideal systems
In the present study, reengineering of inventory control has caused many changes. A summary of the comparison results between traditional excel-based system and new system based on systemic software is presented in table 4.
Old system (Excel-based system) | New system based on information system software
--- | ---
Reports presentation | In many sheets with numerous cells | Clear, user friendly with good color
Report search | Using Excel software that user should know | Using menus without the need for knowing the formula
Responding speed | Very slow | Very fast
Responding time | Time consuming | Within only a few minutes
Updating and observing the changes | After receiving the information and evaluation of the reports with formulas; it is sent to other units using Email or paper prints | All the units can observe the information as soon as the information enters the system
Information security | Very low (error in formula) | Very high
Data sharing | Very slow | Very fast
Information access speed | Very slow | Very fast
Familiarity with practical formulas | User should know the formulas | No need
Simultaneous use of the information by all units | No | Yes
File volume | High and scattered | Storage at database
Accuracy | Very low (operator’s mistakes) | Very high
Method | Very hard | Very easy
Labor | More labor is needed | Reduction of human resource is conspicuous

5.4 Research limitations
- Unavailability of the information system software due to security issues and its exclusivity to the firm.
- Lack of access to the software users due to their business.
- Restriction to the information system software of the studied firm.
- Presence of new personnel and their unfamiliarity with the old system (software-lacking system).
- Weak assistance of some employees and incompleteness of the information sought by the author.
- Scarcity of similar studies due to novelty of the research.

5.5 Recommendations
- Equipping all units with modern and updated facilities including improvement of the existing systems.
- Increasing employees’ awareness and their education in relation to process general facts.
- Information system software should cover all aspects and be used as an integrated software within the system.
- Integration of the software of interest and system of Hamkaran system available in the company to facilitate the affairs of all units.
- Reengineering sale business processes using information system software.
- Measuring the value created by the software in the field of information sharing.
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