

Application of Just-In-Time Principles to Financial Services

Qasim Ali Nisar, Hafiza Kiran Shakeel, Sajjad Ahmad, Kiran Niazi, Samra Ashraf

Abstract: Services sector is considered an essential contributor in GDP of developing countries. Some of the manufacturing related concepts such as JIT have been applied in services sector to generate the same benefits. Due to globalization and continuously changing business environment, concept of 'Just in Time (JIT)' has emerged and is playing intensive role in business environment. It helps in creating competitive advantage by upgrading flexibility of whole system with a view to establish such a production system where consumers purchase goods exactly at the same time when they needed on low cost and predefined quality. The purpose of this study is to examine the applicability of JIT in financial services and it focused on loan approval process in banking sector. Two important dimensions of JIT; 'Quality at Source' and 'Cellular Structure' were selected to examine the magnitude of JIT application in loan approval process. Study is qualitative in nature so data collected through interviews conducted in banks. Results revealed that JIT significantly play its role in financial services and especially in loan approval process of banks. By the application of quality at source and cellular structure; banks can save time, cost and other resources along with quality standards. Results also showed that by the effective application of JIT in loan approval process, banks can make better utilization of their resources and can improve operations efficiency.

Index Terms- Just in Time, Quality at Source, Cellular Structure



1. INTRODUCTION

Services sector is playing effective role and growing rapidly in developing countries. The rising importance of this sector requires great attention. Therefore improvement in services sector will enhance the significant benefits. In global and local scenario financial institutions are trying to improve their services processes and enhance the efficiency of their operations to gain the competitive edge. Due to competitive pressure and globalization, current financial services are catching the emerging interests.

are facilitating wide range of financial services, dealing with complex processes and systems that can cause low productivity and high operational cost. Due to modern information technology, complexity has increased and banks are becoming less efficient [34]. Researchers are working deliberately to find out the new ways that help in maximizing the performance of financial services by reducing the cost, time and other resources. Financial services can also create same benefits like manufacturing and researchers are trying to fill the existing gap between manufacturing and financial institutions. Present study is paying attention towards Just-in-Time which is now considered to be an effective tool in manufacturing as well as in services sector. The aim of current study is to examine the applicability of JIT in financial services. We observed that how JIT is applicable in loan approval process in banking system. Two important dimensions of JIT 'Quality at Source' and 'Cellular Structure' were selected to examine the degree of JIT application in loan approval process. Study is qualitative in nature so data was collected through interviews of bank employees like operations managers and loan approval officers. In the light of literature, first of all this study will help in understanding the concept of JIT and then its application in different sectors of society.

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Effective distribution of products and services of financial institutions can attract investors as well as consumers. Banks

Focused area of study is to examine whether JIT elements are applicable in financial services or not. In chapter two, literature regarding JIT and its applicability in services, financial services and especially in banking services has been discussed. This chapter provides insight understanding of JIT and its effective implementation in financial services. Chapter three includes methodology that explains how this study was conducted. This section includes information regarding data collection and other techniques used to achieve the objectives of study. In fourth and last chapter findings of study have been discussed which in turn will highlight the significant importance of JIT in loan approval processes. In last, study limitations and further directions for research have also been provided.

2. LITERATURE REVIEW

2.1 Just-in-Time

JIT is a Japanese manufacturing model developed in early 1970 to fulfill demand of consumers within short time. It was first established and implemented in Toyota by Taiichi Ohno, Father of JIT. After the introduction and implementation of JIT by Toyota, JIT theory began to be widely used by different industries of Japan; automobile, electronic and many others. The application of JIT can be originated in numerous industries over the world [17]. JIT is a viewpoint, in which all goods are reached when needed, it means zero inventory. The aims of JIT are the eradication of inventory wastage and introduction of production system that involves minimum inventory [18]. Study of Y. Monden [46] represents the philosophy of JIT as, *"producing the necessary item in the necessary quantity at the necessary time is an eternal diver of production and operations management"*. Furthermore, C. Bozarth & R. Handfield [6] defined JIT as *"A philosophy of manufacturing based on planned elimination of all wastes and on continuous improvement of productivity. In broader sense, JIT is applicable to all forms of manufacturing and many forms of services"*. JIT refers to long-term optimization of the whole production and distribution network rather than short run [25]. In addition, objectives of JIT are to enhance the competitive advantage by upturning flexibility of whole system; to create production environment where consumers purchase goods exactly at the same time when they needed on low cost and predefined quality. To accomplish the objectives of JIT there are many approaches of production planning and control [19]. Removal of different kinds of wastes is the main purpose of JIT by refining production activities in a company. JIT system helps organizations to minimize the cost and maximize profits [32]. According to Hay (1988), JIT not only provided company enhancement in quality but also reduces the response time. Cost reduction is the most cited benefit of JIT. Benefits of JIT includes: reduction in inventory, enhancement in quality & productivity levels, improved relationships with suppliers &

customers, improvement in customers' service, reduction in lead time, enhancement in inventory turnover, downtime and workspace reduction ([30]; [28]; [47]; [39]; [22]). Effective implementation of JIT accomplishes two main objectives; improved quality and controlled time of production and delivery of products [10]; [46]; [45]).

Many barriers exist that hinder the effective implementation of JIT in production. The commitment and support of senior management is the commonly described reason for JIT failure. Suppliers' education is another barrier in implementing successful JIT. The companies addressing to this issue are getting great benefits. Another barrier for successful implementation of JIT is local culture other than Japan. According to many researchers, Japanese culture is one of the key causes for JIT success in Japan [35]. Other barriers involve absence of proper training and education of workforce and management, dearth of collaboration with suppliers [37]), lack of employees' contribution, strict timetables and lack of exact forecasting system [47]. JIT creates environment where there are efficient manufacturing system that allow less or no wastage of resources. By the implementation of JIT methodology, flexibility increases, operations time, lot sizes, WIP and total system inventory decreases which results in the reduction of total manufacturing cost.

JIT accomplishes by reducing variability which is the ultimate source of waste. JIT aims to provide products to customers at predefined time, expected quality and low cost. More often, wastes are generated by the over production, rework processing, excessive inventory, unnecessary rotation of employees and the production of defective parts. These wastes can be removed by the use of JIT techniques; Pull philosophy, Kanban technique, reducing setup times, organizing production in cells, redesigning the processes, applying quality at the source. Flow and Pull in production is the main theme of JIT. In a flow, one single item is processed; from raw materials to the finished product involving no delays, defects and disruptions; in a continuous way. In a pull, the customers are responded by delivering the parts to assembly and finished products. JIT results in an efficient manufacturing system that allows less or no wastage of resources. JIT minimizes the setup time and frequent changeovers are feasible. JIT refers to the availability of resources in manufacturing set up "just in time" for their utilization. It involves a number of factors like suppliers send their supplies just in time for their consumption in manufacturing process and end users receive the products or services just in time for the satisfaction of their needs. It also controls wastage of resources like idle employees, manufacturing set up or inventory. It helps in dealing different issues like problems in value chain, efficient operations, improved quality and supply chain, reduction in wastage of resources, inventory and customer satisfaction etc.

In emerging era of globalization improvement in quality and reduction in cost are the two important factors for almost all of the organizations. Bulk of inventories stored in warehouses increases nothing except wastage, space usage and customers' dissatisfaction as their demand frequently changes. The answer of all these problems is the implementation of JIT concept as it has a strong linkage bond with improved quality, reduced cost, space usage and wastage and in meeting the continuously changing demands of the customers. Javadian et al. [24] explained JIT in a way that it is a system that identifies the underlying problems in value chain process. Concept of JIT has been utilizing successfully in large companies but small and medium enterprises (SMEs) still hesitate to implement JIT. It's a fact that SMEs are the real key players of an economy so they should pay attention towards new ways of success. As Gunasekaran et al. [15] summed up that JIT has surprising effects on all parts of the company like, accounting, production, procurement, distribution, finance, transport etc. This study realized that JIT is as functional and practical for SMEs as for the large scale enterprises. In addition Bon et al. [4] carried out the research in electronic component industry and findings revealed the successful implementation of JIT. Similarly, supply chain management (SCM) is an integral part of the JIT and Singh et al. [40] worked on this unique dimension and checked the magnitude of this relationship. Researcher described the two prominent aspects of SCM that are lean manufacturing and JIT. Lean manufacturing is actually based on JIT principles. Furthermore Gunasekaran [16] proposed that JIT purchasing is also a fundamental part of the JIT management practices as it incredibly influences accounting, production, distribution and other operations. In addition, Bandyopadhyay et al. [2] described two important JIT operations; purchasing and manufacturing with respect to key element; involvement of executive team, training for employees' understanding, development of JIT policy and procedural manual, flexible environment for the implementation of required changes, effectual control and communication system for feedback.. Bandyopadhyay et al. [2] also explained that JIT is not a onetime action in fact it is a continuous process. During the implementation of JIT management practices in organization, continuous inspection is also required to achieve the desired level of operations.

2.2 JIT in Services

Duclos et al. [11] described that JIT has been pivotal of interest for the manufacturers and researchers over the past decades. However, by reviewing the different concepts of JIT, there come the opportunities for involving the JIT techniques in service functions in any kind of firm. As Gupta AK [13] mentioned that only few intellectual studies have been reported in non-manufacturing environment. Furthermore, Duclos et al. [11] also pointed out that the research area was quite narrow for services sector which is now being focused

to typical service businesses like insurance, retailers, mail orders etc. The quality of service can be improved by minimizing the lead time of service provision [13] and work in process using the JIT methods. It is also beneficial for increasing the productivity of the economy on broader level. Another study summed up that services sector has a major part in GDP of many developed countries so the JIT has vital role in both manufacturing and services sectors. Synchronization, balance of information, work flow, total visibility of all process components, continuous process improvements, holistic approach of wastage elimination, flexible resources usage and respect for people are the six main practices of JIT system which are applicable in the services sector. Similarly, Gupta AK [14] proposed that in today's persistently growing global struggle, latest technology and the advanced treatment methods have modified the structure in which services sector can now achieve greater degree of success. There is need to use the allocated resources in the right way by reducing the operation cost and optimizing the output for satisfied customers. JIT process helps in provision of service when demand arises with high quality. It can be achieved by implementing cost accounting methods and improved supply chain practices as per exercised in JIT systems. Canel et al. [7] described the role of suppliers in the JIT implementation in services. Good terms with suppliers are the blood cells of JIT concept in services because the provision of quality service at the demand time is necessary for customers' satisfaction.

2.3 JIT in Financial Services

With the help of past literature, different elements of JIT have distinguished on the basis that whether they are appropriate or inappropriate for financial services [26]; [42]; [31]; [5]; [11]; [8]; [1]; [44]; [9] and following concepts of JIT are found to be applicable in financial institutions. Financial services are the economic services provided by the finance industry which encompasses a broad range of organizations that manage money. These organizations include banks, credit card companies, insurance companies, stock brokerages, accountancy companies, investment funds and government sponsored enterprises as well. The reason due to which the financial services are attracting interest is the competition due to globalization which is done by mergers, product/service distribution, and the shift from products to customers. Banks which are giving financial services have complex procedures and systems that obstruct the productivity and the financial costs are also high because of these factors efficiency of banks has slowed down. New technology needs complex systems but not at the cost of expected return on investment [34]. Costs associated with the financial services are very high and researchers are continuously trying to find new ways that help in reduction of these costs. Services are significantly different from manufacturing hence the processes of manufacturing and services sector cannot be similar.

The application of lean principles is now being investigated in the banking sector which is known as lean banking. In lean banking, the main focus is Just-in-time; a focus of lean manufacturing as well. Lean banking tends to examine the applicability of JIT in banking. As Manou, O. [27] explored the applicability of lean manufacturing concepts to operations of financial services. This study also shed light on the impact of quality service and cellular organization on the basic principle sources in loan application operations. JIT concept along with specific characteristics implemented to operations of financial services can significantly boost the performance of organization and productivity by lessening the cycle time and consumption of resources simultaneously. It also has positive effect on workforce; enabling it to perform multiple activities and amplifying the value added time along with reduced lingering time. Moreover, it lessens the average resource utilization by the number of required employees. Hence, reduction of rework and inspection improves performance substantially. Customers are also more interested and involved in their service delivery through implementation of JIT process in the customer-server interface. But the interface between the front and back office should be fully coordinated and defect free for the robust in disruption. Other JIT methods like responsiveness of pull, leveling the production, establishing a WIP and queue control mechanism are the key JIT elements that can contribute significantly to flourish the financial services.

2.4 Pillars of JIT

Quality at source and cellular structure are the preconditions that should exist for the establishment of flow.

Quality at Source:

According to JIT, quality at source constitutes of two main principles: Total Quality Management (TQM) and Total Productive Maintenance (TPM). TQM and TPM are considered to be the key operational activities of quality management system. TPM increases the productivity of plant and equipment with an uncertain investment in maintenance. TPM includes the techniques of preventive maintenance (scheduled maintenance to avoid breakdowns), predictive maintenance (prediction of pending machine breakdowns and appropriate intervention to prevent them) and improvement maintenance (prediction of pending machine break downs and appropriate intervention to prevent them). TQM comprises of organization wide efforts to establish and install a setup where an organization continuously improves its ability to deliver high quality products and services to customers. TQM includes standardized work (accomplished by defining the sequence of the processes and tasks, designing properly the cell and establishing the minimum number of pieces needed to maintain a smooth flow of work; to limit the cycle time to be equal or slightly less than the task

time), visual control, poke yoke, and kaizen. Visual control is referred to the design of a production system that controls itself by clearly identifying where the problems are. Moreover, it creates a sense of urgency whenever it is necessary. In particular, visual means of control should be designed for each and every worker in order to assume his actions for maintaining the control of the production system [8]. Poka Yoke (mistake proofing) is a device or a process for defect prevention that aims to avoid errors in the process of orders receiving or in the manufacturing process. The whole idea is to produce zero defective products by using the poka yoke. Kaizen or Kaizen Event (Blitz) is a Japanese term meaning continuous improvement in the processes in order to eliminate waste and to enhance value. The kaizen technique aims in reducing non-value added activities such as setup times, unnecessary transport of materials, etc. This kind of improvement can be attained through proper training of employees in order to obtain problem solving skills. Thus, enabling the employees to identify and implement potential improvements [8]. Implementation of quality at source techniques aim to reduce manufacturing costs (e.g. costs occurring by the shorter life cycle of the machines, major equipment repairs etc.) while at the same time upgrading the quality of the products.

Cellular Structure:

Cellular structure is the association of the manufacturing facility such as people, materials, machines, and design in cells, dedicated or semi-dedicated in product families. The cellular system is also known as lean shop with linked cell design and it is considered to be a basic component of the lean production philosophy [3]. Lean production cells operate at less-than-full-capacity. Workstations within a cell usually follow a U-shape arrangement for the flexibility so that workers may move from one machine to another for loading and unloading of their parts while following the possible short distance with the least possible obstacles. In a JIT manufacturing cell, one operator is often able to run two, three or more machines; all performing operations on the same piece moving it from operation to operation in sequence (one-single piece at one time). This is due to the fact that U-shape layout enables the operators to be physically together; side-by-side/back-to-back without interrupting, annoying or hindering each other. Workstations that perform successive operations need to be located close to each other so that parts can flow easily from one to another. Moreover, this kind of layout supports flexibility in the number of workers since one worker may operate more than one (and possible all) workstations within the cell. Therefore, the number of workers can be easily adjusted to the demand and calculated cycle time. Cellular structure results in significant benefits; reduction in setup times, raw materials, WIP, number of defects, cycle time variability etc. As a result, quality improves and total manufacturing costs reduce. Finally, a smoother and faster flow of operations is achieved.

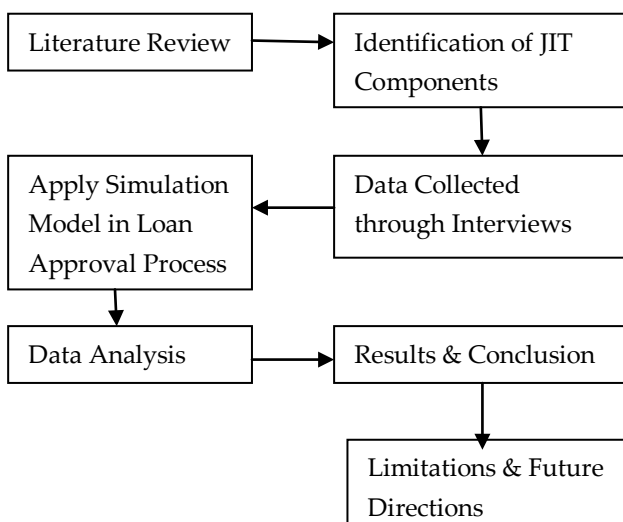
With the support of literature following Table is describing different JIT practices implemented in financial services organizations:

Elements of JIT	Applicability in Financial Services
1. Quality at Source	Many examples found like different techniques used which facilitate self inspection, visual control and standardization.
2. Cellular Structure	Some examples found regarding engagement of employees into cells and processes. It also involves grouping of products into families due to specialized activities.
3. Reduced Setup Times	No applicability found since setups (i.e. quantity independent time spent) typically don't exist in financial services.
4. Kanban Technique	No application found in the literature however, this is a vital tool and enable to enough create significant improvements in certain types of financial services' operations.
5. Development of Supplier Networks	No application found in the literature.
6. Employees Involvement	Literature supports the application of Employees involvement in financial services.

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3. Methodology

The objective of this study is to apply two important concepts of JIT in banking process; personal loan approval. Loan approval process has been selected because loan is considered to be the most typical and important banking product and operational problems in this process which causes heavy losses for the bank. In this study, concepts of JIT under consideration are; 'Quality at Source' and 'Cellular Structure'. The reason behind the selection of first concept is the poor quality of process (e.g. incomplete applications, mistakes in application, missing documents etc.) that becomes the cause of resources' wastage and leads to unnecessary rework, mistakes or wrong decisions regarding loan approval. Cellular structure has selected to examine the new trend in banking operations. Banking operations shifted from traditional method of personnel arrangement to more effective and successful method of organized work. This concept used in lean manufacturing. Other elements of JIT have ignored because they thought to be irrelevant and unimportant regarding financial services (Chios, 2007). Study is qualitative in nature and data collected by applying non probability convenient sampling technique. Data collected through Interviews from credit department of different banks. The credit department daily receives a number of loan applications through electronic channel. Properly complete application along with documents then processed and evaluated. Data used to construct model is not based on observations instead it has been collected for simulation model from operations managers and loan approval officers of banks through in depth interviews. We used simulation model to examine the effective application of JIT in loan approval process.



We spot out different JIT components with the help of literature. All elements of JIT may not be an easy task to apply in selected sector so we selected two elements of JIT; Quality at Source, Cellular Structure. These two elements are easily applicable in banking sector. Data collected through interviews after taking formal appointment from banks managers. After this data analyzed to examine the application of JIT in banking sector. We used simulation model developed by Chios (2007).

Description of Loan Approval Simulation Model

- Loans Family A represents Amortized Loans
- Loans Family B represents Revolving Loans
- Loans Family C represents Secure Loans

Each loan application follows predefined process with different stages of approval. We modeled three types of structure with different arrangement of resources and same inputs to examine the role of JIT in loan approval process.

Simulation Model Components:

Entities:

- Loans --- Three types of loan applications exist: loan A, loan B and loan C. Each is further divided to four subtypes according to the loan amount.
- Servers --- Three types of servers exist: loan officers, head clerks and managers. Furthermore, two types of systems are used: high capacity system and low capacity system.

Model Assumptions:

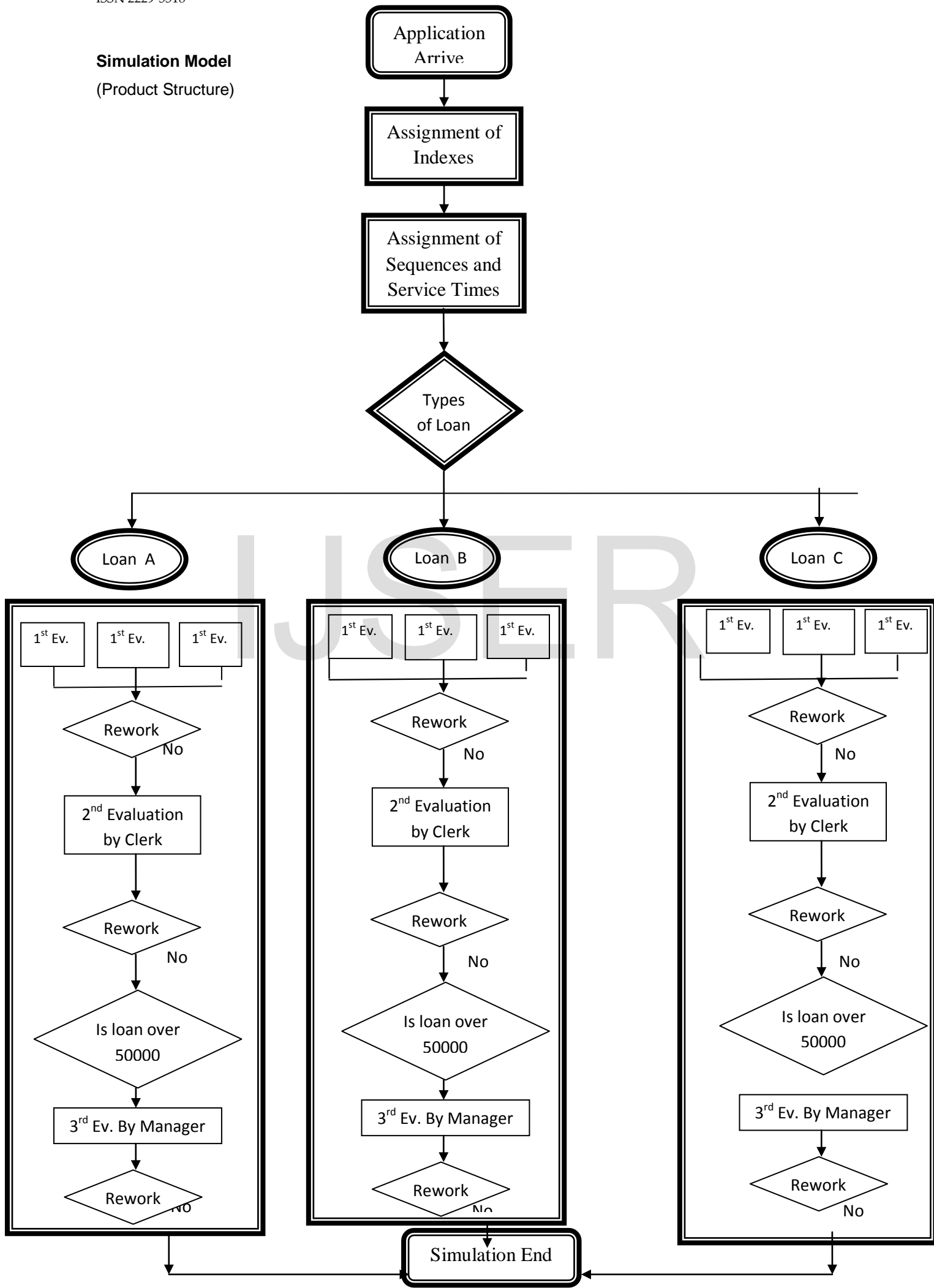
1. Specified number of servers
2. Known arrival process
3. Specified sequence of operations per product
4. Known service time distributions
5. Infinite length of queue
6. Queue sequencing; FIFO (First In – First Out)
7. Specified percentage of rework

Simulation Model Description:

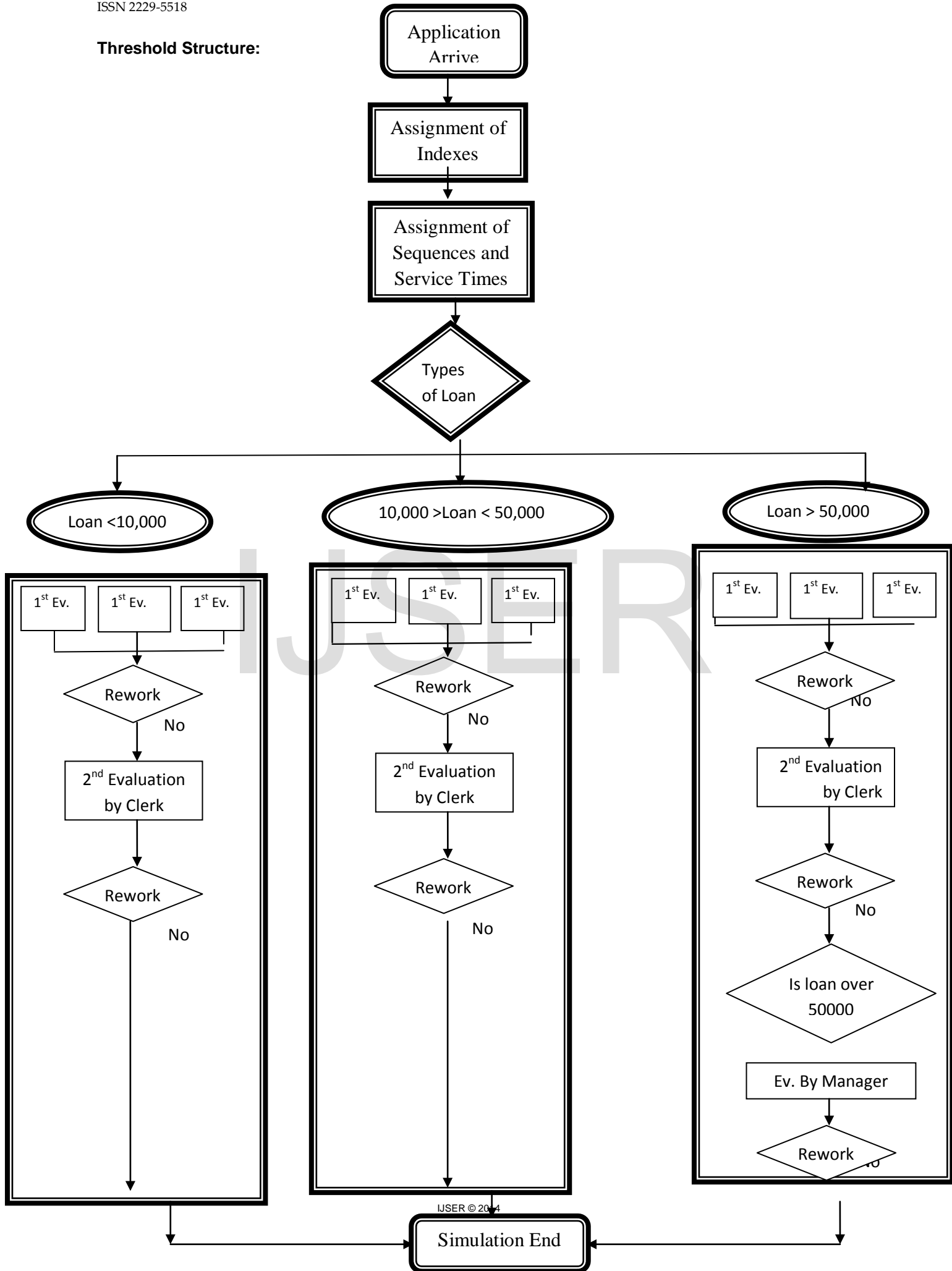
In this model researcher defined different types of structure;

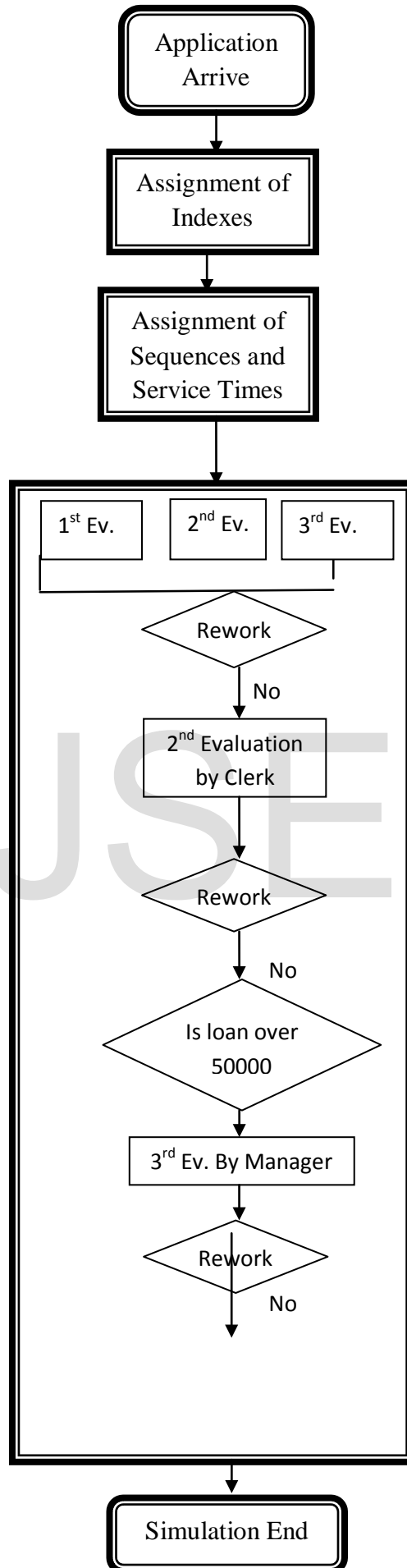
- Product Structure
- Threshold Structure
- Lean Structure

Simulation Model
(Product Structure)



Threshold Structure:





4. Findings

The objective of this study is to apply two important concept of JIT in banking process; personal loan approval. With the help of interviews we probe the application of above mentioned three models and found following results which shows the importance of lean structure concept and its effective application in banking sector.

Figure 1:

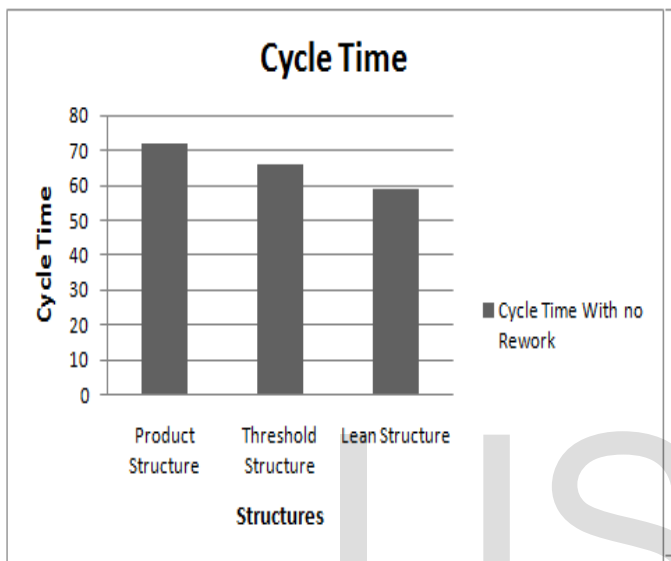
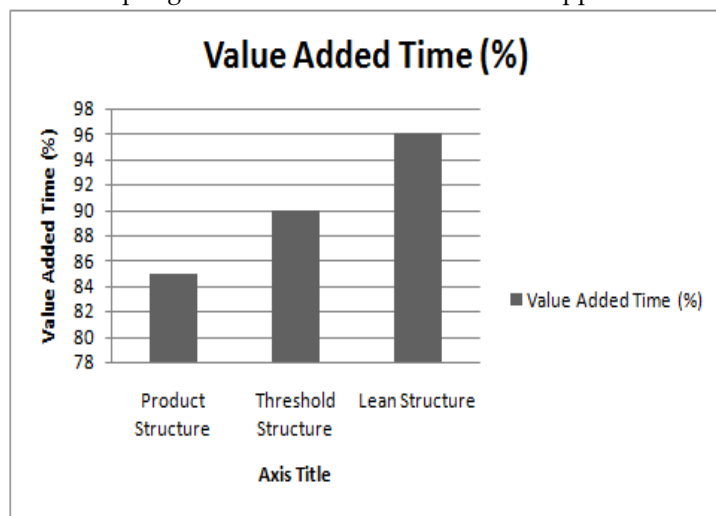


Figure 1 showing that how different operational structures effect cycle time of loan approval process. We developed three models to examine the effective application of lean structure in loan approval process. Figure showing that cycle time while adopting product structure, threshold structure and lean structure is 72, 66, 59 minutes respectively. Lean structure is more effective as its cycle time is lower than other structures which showing the importance of lean structure for loan approval process. This figure supporting our argument that JIT is applicable efficiently. As in banking sector, operations should be performed timely and efficiently and especially loan approval process need efficient management and less process time. So lean structure can be a useful tool to perform loan approval functions efficiently.

Figure 2:

Figure 2 explaining the value added time in percentage while adopting different structures for loan approval



process. Figure showing that in lean structure banks can utilize time effectively. Figure 2 showing that value added time during loan approval process are 85%, 90% and 96% for product structure, threshold structure and lean structure respectively.

Figure 3:

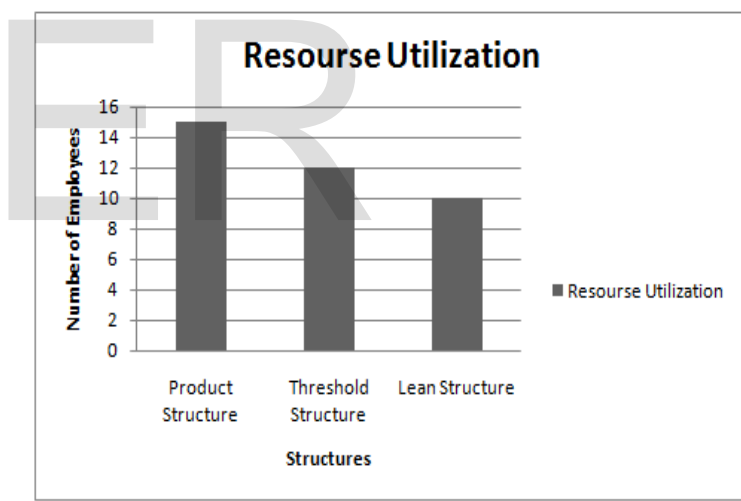


Figure 3 showing the resources utilization in different structures. We can observe that number of employees for product structure, threshold structure and lean structure are 15, 12 and 10 respectively. In lean structure banks need less number of employees as compare to other structures because employees in lean structure can perform multi tasks. Banks can save their operations cost by adopting lean structure.

5. Conclusion:

The purpose of this paper is to understand the role of JIT in services and especially in financial services. First we

developed understanding of JIT concept by reviewing the literature. First of all, in the light of literature this paper presented the overall concept of JIT and then its application in different sectors. The present study focused to examine whether JIT elements are applicable in financial services or not. We applied two different concepts of JIT "Quality at Source" and "Lean Structure" in loan approval process. Study is qualitative in nature and data collected by applying non probability convenient sampling technique. Data collected through Interviews from credit department of different banks. The credit department daily receives a number of loan applications through electronic channel. Properly complete application along with documents then processed and evaluated. Data used to construct model is not based on observations instead it has been collected for simulation model from operations managers and loan approval officers of banks through in depth interviews. We used simulation model to examine the effective application of JIT in loan approval process.

We used simulation model to examine the significant implementation of these two elements. Simulation model included three different structures and after the comparison results revealed that threshold and lean structure significantly enhance the performance of loan approval system. Lean structure showed the highest performance due to its capacity reduction ability without overloading the system. It also allowed effective distribution of work among employees inside the system. Since at every stage, new application is submitted to first available employee. In this structure, utilization of resources gets reduced without effecting the productivity and quality of services. Cellular structure proved to be very effective if employees are facilitated with proper training and development programs in dynamic environment. Multifunctional employees can enhance the services' performance in lean structure by reducing defects, standardization of work, balanced workload etc. Results indicated that rework elimination can improve the lean structure capability. Rework can be eliminated by applying the quality at source techniques which in turn enhance the productivity.

It is concluded that rearrangement of human resources into multiple activities can enhance the value added time and decrease the lingering time due to which cycle time reduces automatically. Similarly lean structure also reduces resource utilization and number of employees. Application of quality techniques is becoming challenging due to continuously increasing involvement of customers in services. To maintain and enhance the services quality, there should be synchronized environment between front and back office in order to make process in flow without interruption. Multifunction employees and quality standards are considered to be crucial in order to gain benefits of quality at source and cellular structure. Other ignored methods and elements may also applicable in financial services.

Study conclusion is that Just-In-Time is playing effective role in banking sector and especially in loan approval process. Lean Structure is more beneficial in this process as results revealed that by adopting cellular structure banks can reduce their cycle time and operational cost due to its effectiveness. Banks can use this study results to make their loan approval process more efficient and cost effective.

6. Limitation & Future Directions

This study also has some limitations and in future researchers can mitigate mentioned limitation to improve the outcomes and to gain more refined results. First limitation is that study is qualitative in nature due to which results are not so much reliable and magnitude of responses can't be estimated effectively. So in future researchers should conduct quantitative study to examine the role of JIT in banking sector. Sample size is also a constraint in this study as sample size was too small. In future sample size should be large to gain more effective results.

Number of other JIT elements ignored in this study so in further researchers can investigate the other ignored elements. In future JIT elements should also be examined in the other operational processes at banks. Researchers should also develop JIT model including moderating and mediating variables which can affect the operations performance in different sectors. Researcher can expand the scope of this study by making comparison of JIT application in manufacturing as well as services sector. There are different factors which can also effect the application of JIT in banking sector like cultural constraints, demographic perspectives, economic conditions etc. So in future these factors can be under consideration to evaluate the role of JIT in banking sector,

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