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Review on Elements for Just in Time Implementation in Indian Service Sector

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Abstract

Just in time (JIT) philosophy has grown to new heights since its evolution and has successfully been implemented in manufacturing. Aim of present study is to evaluate various elements of JIT to implement in Indian service sector which have high degree of importance. It is because now service sector is also plays an important role in optimization of business processes. Service sector operations are much like manufacturing operations where both employ processes that add value to the basic input used to create the end product. For this, literature related to JIT usage and performance is reviewed. Thirty-eight elements are analyzed from twenty-two research papers of Indian context. With aid of theoretical analysis and brain storming with service sector specialists of Just in Time elements implemented service sector industries, sixteen elements are selected to check implementation of JIT philosophy in service sector of Indian context. Relative importance of such elements are also highlighted in the article.

Keywords: Just in time (JIT), Maintenance, JIT elements, JIT in maintenance, JIT in manufacturing.

1. INTRODUCTION

JIT techniques are used to reduce non-value adding activities like; set up time reduction, autonomous or modular cells, JIT layout, pull system (Kanban system of

production control), buffer stock removal, continuous improvement, total productive maintenance, quality- at- source, JIT purchasing and employee improvement**.** The present study aims to study the JIT elements of manufacturing with a view of application in Indian service sector. As it is crystal clear that the present-day service sector strategy is the removal of cause of uncertainty. Considering the objectives of service sector thirty eight JIT elements analyzed and sixteen JIT elements were selected. These elements benefit the service sector companies to complete the slow progress well in time.

2. JIT CONCEPTS IN INDIAN CONTEXT

Wakchaure et al. (2006) conducted a survey on 45 industries where Indian industries were found practicing for, lot size reduction; respect for humanity; product scheduling; quality circles, lifelong employment; set up time reduction; kaizen; WIP reduction; preventive maintenance; smooth built up rate; and reliable and prompt delivery. The reason listed for slow implementation of JIT are, lack of information; lack of justification for practicing JIT; lack of consultancy assistance available; lack of formal cross training program for workers; problems in maintenance time reduction; and initial high investment in layout reconfiguration to suit JIT requirements. Deshmukh and Garg (2010) carried out a survey of JIT purchasing elements in Indian context and find out the relative importance of such elements. With the help of this survey some research directions were identified which needed close scrutiny. Kumar (2010) reviewed the literature of JIT philosophy based quality organizations in Indian perspective and presented its concepts, accomplishment strategies and advantages. Singh et al. (2011) discussed the behavior of JIT purchasing in Indian circumstances and provide a proportional analysis of difference between JIT purchasing and conventional Indian purchasing system by highlighting the problems encountered in JIT purchasing implementation and benefits. The JIT elements of manufacturing yielded after exhaustive literature review are tabulated in table 1.

Table 1: Literature revealed JIT elements of manufacturing in Indian Context

Author	JIT Elements																		
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
Kumar (2014)	*	*	*	*	*	*		*	*	*	*	*		*	*		*	*	*
Kumar et al. (2013)		*	*	*				*	*			*	*		*	*	*		
Paliwal et al. (2013)		*	*	*			*		*	*		*			*		*		
Kootane et al. (2013)		*	*	*			*	*	*		*	*							
Gupta (2011a)		*	*	*							*	*	*	*		*			
Gupta & Garg (2012)	*	*	*	*					*	*	*	*	*						
Gupta (2012a)		*		*				*			*	*		*					
Singh and Garg (2011)		*	*	*				*		*	*	*	*	*					*

Shah (2011)													*						
Singh and Garg (2011a)	*	*	*				*	*	*	*	*				*	*	*	*	*
Lohar (2000)		*				*			*			*			*	*	*		
Singh (2011)				*			*		*	*	*	*	*						
Gupta (2011)	*	*	*	*					*			*	*		*	*	*		
Melorose et al. (2011)			*	*	*	*						*							*
Gupta (2012)		*	*	*	*		*		*		*	*		*	*				*
Agrawal (2010)		*	*	*	*		*			*	*	*	*		*	*			
Garg and Deshmukh (1999)		*		*		*		*			*	*			*				*
Kumar (2010)	*	*	*	*	*		*		*	*	*	*		*	*	*		*	*
Farooquiea & Mohapatrab (2009)		*		*				*	*	*			*						
Wakchaure et al. (2006)	*	*	*	*	*	*	*	*	*	*	*	*		*	*	*	*	*	*
Kumar et al. (2004)	*	*	*	*	*	*		*	*	*	*	*			*	*		*	*
Mahadevan (1999)		*	*	*			*		*	*	*	*	*		*		*	*	
Frequency	7	19	16	19	7	6	9	10	15	12	15	19	10	7	13	9	8	6	9
	T	**U**	**V**	**W**	**X**	**Y**	**Z**	**AA**	**AB**	**AC**	**AD**	**AE**	**AF**	**AG**	**AH**	**AI**	**AJ**	**AK**	**AL**
Kumar (2014)	*	*			*	*	*	*	*	*								*	*
Kumar et al. (2013)				*	*	*			*										
Paliwal et al. (2013)				*	*	*		*			*		*	*		*	*		
Kootane et al. (2013)				*	*	*			*	*			*		*				
Gupta (2011a)		*	*		*						*	*	*				*		
Gupta & Garg (2012)				*	*					*			*			*		*	
Gupta (2012a)		*			*	*			*		*		*					*	*
Singh and Garg (2011)		*	*	*	*		*			*	*	*		*	*				
Shah (2011)														*		*	*		
Singh and Garg (2011a)	*	*			*	*		*	*	*	*		*	*				*	*
Lohar (2000)			*			*		*			*		*	*					
Singh (2011)		*			*				*	*			*			*	*		
Gupta (2011)	*		*										*		*			*	*
Melorose et al. (2011)				*				*					*			*			
Gupta (2012)	*	*		*	*	*		*	*	*	*		*			*		*	*
Agrawal (2010)	*	*			*						*	*		*			*	*	*
Garg and Deshmukh (1999)		*	*			*	*	*		*	*	*	*	*	*	*	*	*	*

Kumar (2010)	*	*	*		*	*	*	*	*		*	*	*			*		*	*
Farooquiea & Mohapatrab (2009)				*	*				*					*					
Wakchaure et al. (2006)	*	*	*		*	*	*	*	*	*	*	*	*		*	*		*	*
Kumar et al. (2004)	*	*		*	*	*	*	*	*	*	*		*	*			*	*	
Mahadevan (1999)	*	*	*		*			*					*	*			*		
Frequency	9	13	8	9	17	12	6	11	11	10	12	6	15	10	5	9	8	11	9

Table 2: List of Alphabetic abbreviations used in table 1

Alphabetic abbreviation	Name of element	Alphabetic abbreviation	Name of element
A	Buffer Stock Removal	T	Statistical Process control
B	Continuous Improvement (kaizen)	U	Statistical quality control
C	Effective Communication	V	Strong buyer-supplier relationship
D	Employee Empowerment & Involvement	W	Team work
E	Error Prevention (poka-yoke)	X	Total quality control
F	Frequent and Reliable delivery	Y	Layout improvement
G	Kanban	Z	Vendor rating
H	Long Term Quality Control [QC] commitment	AA	Scheduling flexibility/ Under capacity Scheduling
I	Multi-functional worker	AB	Zero defect
J	Total Productive Maintenance	AC	100% quality inspection
K	QC authority to worker	AD	Waste Reduction
L	Education & training to workers & suppliers	AE	Uninterrupted work flow
M	Quality certification of supplier	AF	Top Management Commitment
N	Regular quality auditing	AG	Inventory Management
O	Set up time reduction	AH	MRP
P	Short lead time	AI	Autonomation (Jidoka)
Q	Small lot size	AJ	JIT Purchasing
R	Standard containers	AK	Process Simplification
S	Standardization	AL	Process Flexibility

Shah (2011) developed an integrated inventory model for supply chain of single buyer and single supplier and minimized total integrated cost of the system. Singh et al. (2011a) presented the spread of JIT objectives, movement, concepts, benefits, elements, execution and motivation of JIT philosophy in Indian context. Lohal (2011) collected data from thirty-three industries by the help of questionnaire fill up, on the basis of collected data critical elements were identified and checked the degree of difficulty and degree of importance in adoption of JIT system, solutions were also highlighted to resolve these problems. Gupta (2011) developed a theoretical model based on the reviewed literature in the area of service quality and JIT philosophy. Model is tested by using authentic data commencing service organizations to check the persuade of JIT on service industries and finally framework to hold up the JIT implementation in service organizations was developed. Gupta (2012) reviewed literature on JIT philosophy implementation in Indian context and some research issues were highlighted. Gupta et al. (2012) widely discussed the JIT manufacturing philosophy in different industries of Indian context and highlighted some important insights pertaining to it. Garg et al. (2013) addressed the necessary initiatives required to be taken by the management of Indian manufacturing industries. They investigated and concluded the operations and procedures modifications required for the successful implementation of JIT philosophy with the help of survey conducted on literature. Poliwal et al. (2013) explained the broadening of JIT concepts, movement, benefits, obstructions and implementation of JIT philosophy in Indian industrialized system by analyzing literature. Babu et al. (2013) discussed in depth overall JIT concepts and the factors necessary for JIT philosophy implementation in Indian context. Kumar (2014) reviewed literature related to JIT usage and performance in Indian perspective. Thirty-seven identified elements of JIT manufacturing system were classified into five main categories from twenty-one research papers and relative importance of all the thirty-seven elements were highlighted.

3. JIT ELEMENTS

The detailed description of the JIT elements after reviewed from the literature is:

Buffer stock removal is a JIT technique to reduce non-value added activities. A buffer stock approach is an attempt of storage to stabilize prices in the market. Buffer stock has strong relationship with batch size and JIT purchase, and weak relationship with process and product standardization. Continuous improvement (kaizen) means "change for better. The word also refers to continuous. It is widely researched in production systems. There exist no processes that are perfect, thus a need for continuous improvement is always there. Effective communication in JIT aims in time and material waste reduction. Employee empowerment & involvement is a necessary activity. Successful implementation of JIT in an organization largely depends of front-line employees. Error prevention (poke-yoke) is a tool for inadvertent error prevention and to prevent errors originating in the mistake to reduce quality control. Kanban is the scheduling system for JIT and lean manufacturing. It is also an inventory control tool for supply chain.

Long term QC commitment is not an overnight achievement. It is the result of close agreement of JIT principles with hard work over many quality plans. Multi-functional worker refers to the capability of the workers to perform various activities. It was considered to be the most important JIT element by Jurado et al. (2014) for the success of JIT philosophy. Total Preventive Maintenance – this technique of maintenance is helpful to improve the quality, flexibility and cost by increasing precise time bound enhancement action plans.

Quality control authority to worker – This element of JIT provides authority to the workers to take corrective action to improve the quality of the product. Education & training to workers ensures must be closely linked because the product quality depends not only on machinery and equipment, but also on the education and training of managers who develop plans and workers who execute these plans, Ooi (2014). Set up time reduction is required to increase the production rate and maximize the profits.

Standardization - It is one of the essential elements required for successful implementation of JIT. By applying the concept of standardization, easy availability and inter-changeability of tools and parts is ensured, making the processes simple. Statistical Process control plays a key role in service sector. Total quality control – Quality is a major element to reduce uncertainty and non-value-added activity in an organization. JIT concept for quality is 'Do it right the first time'. It eliminates time and materials waste. Quality certification of supplier helps in supplies selection for future use. Regular quality auditing helps to improve quality and list out the strengths and weaknesses in the system. Short lead time is the outcome by application of JIT. Small lot size reduces complexity. A standard container helps in easy counting, assembly processes and inventory handling. Layout improvement involves futuristic plans. Vendor rating identifies best vendors and starts a competition among vendors to supply quality items and service. Scheduling flexibility/under capacity scheduling reduces complexity and ensures on time delivery. Zero defect targets improve quality. 100% quality inspection ensures no rejection and no customer complaints. Waste elimination is the key feature and element of JIT in all business functions. Uninterrupted work flow increases the availability of the machines and the system. Top management commitment works like a soul in the human resources. Inventory management is again the primary element of JIT. Process simplification is required for easy working. Process flexibility ensures on time delivery and shorter make span. JIT purchasing reduces inventory. Leveling of production improves processes functions and workforces. Pull system reduces inventory. Strong buyer-supplier relationship develops confidence in entrepreneur for higher investment for the project. Team work improves the processes in all respects. Low cost is the desire of everyone connected to the product. From the above listed JIT elements, the following elements are selected as JIT elements for application in maintenance.

Based on the described in depth theoretical analysis of the reviewed literature and brain storming with service sector professionals of JIT elements implemented industries the following sixteen JIT elements are selected from thirty-eight JIT elements to analyze implementation of JIT in maintenance sector of Indian context.

JIT element	**Role of element**
Continuous Improvement (kaizen)	To improve machine availability and decrease maintenance time.
Effective Communication	To coordinate among the team and with others for perfect maintenance.
Employee Involvement	To improve involvement and skills.
Flexible/Multi Skilled Workforce	Even in non-availability of skilled human resource, the work should not get effected and to improve workforce flexibility.
Total Productive Maintenance	To reduce breakdown maintenance.
Workers centered quality control	Improve responsibility and work quality.
Education & training	Employee remains updated with latest technological changes in maintenance.
Set up time reduction	Increase production by reducing time.
Statistical quality control	Learn from past experience.
Total quality control	Reduce rejections.
Layout improvement	Reduce complexity
Under capacity Scheduling	Improve workforce flexibility.
Zero defects	To reduce scrap and re-work tasks.
Waste Reduction	Reduce cost of maintenance.
Role of top management	Enhance feelings of responsibility among workforce.
Process Simplification	Reduces maintenance time and cost.

4. CONCLUSION

In depth theoretical analysis of the reviewed literature is carried out after reviewing twenty-two studies related to the Indian manufacturing system and personal interview of the service sector managers of JIT elements implemented Indian service sector industries. Based on this analysis sixteen of the thirty-eight JIT elements are selected, on which an analytical study will be conducted to analyze the application of JIT elements in service sector of Indian context. A questionnaire is prepared and is forwarded to engineer or higher position professionals of different service sector

industries in Indian context for the survey. The collected data from the survey is statistically analyzed and results will be published in the next chapter.

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