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A STUDY ON UPGRADING JUST IN TIME TECHNOLOGY IN FLIPKART

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Abstract: This study explores the application and potential enhancement of Just in Time (JIT) technology within Flipkart's supply chain operations. As one of India's largest e-commerce platforms, Flipkart relies heavily on efficient logistics and inventory management systems to meet customer demands. The research focuses on evaluating current JIT practices used by Flipkart, identifying inefficiencies or bottlenecks, and proposing advanced strategies or technologies—such as AI-driven demand forecasting, real-time data analytics, and automated warehousing—to upgrade its JIT framework. The study also examines the impact of these upgrades on operational costs, delivery speed, and customer satisfaction. By aligning JIT principles with modern technological innovations, the research aims to present a roadmap for Flipkart to enhance responsiveness, reduce waste, and strengthen its competitive edge in the fast-paced e-commerce environment.

Key Points: Upgrading, Just in Time (JIT), Flipkart, Supply Chain, Efficiency, Inventory Management, Demand Forecasting, Real-Time Data, Automation, Customer Satisfaction, Competitiveness.

I. INTRODUCTION

In the increasingly dynamic and competitive landscape of e-commerce, supply chain agility and responsiveness are critical for sustaining market leadership. Flipkart, one of India's largest online retail platforms, operates in an environment where customer expectations for faster delivery, better service, and real-time product availability are constantly growing. To meet these expectations, the company must continuously improve its logistics and inventory management systems. One such approach is the application of Just in Time (JIT) technology, a lean inventory strategy designed to reduce holding costs, eliminate waste, and ensure products are available exactly when needed. While Flipkart has integrated several JIT principles into its operations, the rapid evolution of digital technologies and increasing market complexity highlight the need to upgrade and modernize these systems. This study delves into the current state of JIT practices at Flipkart, identifying operational inefficiencies and exploring how technological advancements—such as AI-powered demand forecasting, IoT-enabled tracking systems, warehouse automation, and real-time data sharing—can transform its supply chain model. Furthermore, it assesses the challenges Flipkart may face in implementing such upgrades, including issues related to scalability, data security, and employee adaptation. By aligning upgraded JIT strategies with customer-centric goals, Flipkart can enhance operational efficiency, reduce turnaround times, and strengthen its competitive edge in the global e-commerce marketplace. This research ultimately aims to provide a strategic framework for leveraging digital transformation to optimize JIT technology within Flipkart's supply chain network.

STATEMENT OF THE PROBLEM

- To Upgrading existing systems and integrating new software can be complex and expensive, particularly for organizations with outdated technology infrastructure.
- To Upgrading manufacturing infrastructure for Just in Time To Understanding the technological barriers and adoption challenges faced by the Just in Time Technology.
- To Upgrading software and infrastructure to fit with JIT methods is hard, making it tough to adopt Just in Time.
- Technology poses costly and time-consuming challenges.
- The continued operation of JIT technology necessitates regular maintenance and support, which raises the overall implementation and administration costs.

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OBJECTIVES OF THE STUDY

PRIMARY OBJECTIVES

- The primary objectives are upgrading Just in Time Technology within the Flipkart.

SECONDARY OBJECTIVES

- To Investigate and analyze the specific organizational needs and challenges in procurement, production scheduling, and order fulfilment processes.
- To Examine how JIT technology affects the effectiveness of production scheduling and how it shortens lead times across a range of industries.
- To Examine how well JIT technology works with various organizational models to cut down on overproduction and inventory storage costs.

SCOPE OF THE STUDY

This study focuses on evaluating and enhancing the Just in Time (JIT) technology used in Flipkart's supply chain and logistics operations. The scope includes an in-depth analysis of current JIT practices implemented by Flipkart, with the aim of identifying areas of inefficiency, delays, and inventory-related challenges. It further explores how emerging technologies—such as artificial intelligence, machine learning, real-time analytics, Internet of Things (IoT), and warehouse automation—can be integrated to improve JIT performance. The study will concentrate on key functional areas such as inventory management, order fulfillment, warehouse operations, and last-mile delivery. Geographically, the study is limited to Flipkart's operations within India, considering regional logistics patterns and infrastructure. It also considers the role of supplier coordination, customer demand fluctuations, and digital infrastructure in the successful implementation of upgraded JIT systems. However, financial audits, in-depth employee training modules, and third-party logistics performance evaluations are beyond the direct scope of this research. The findings aim to support Flipkart in making informed strategic decisions for future technological adoption and supply chain optimization.

II. LITERATURE REVIEW

Callen, J. L., Morel, M., & Fader, C. (2003). Comparing Just-In-Time (JIT) manufacturing versus traditional non-JIT manufacturing, this study examines the risks and profitability of JIT manufacturing. It appears that JIT manufacturing is more profitable based on prior qualitative and quantitative evaluations. This research endeavors to determine if the increased profitability of just-in-time (JIT) manufacturing outweighs the associated operational hazards. The study's results quite significantly refute the notion that JIT profits only balance risks. On the contrary, they show that risk and profitability are inversely connected, especially for JIT factories. Furthermore, the sample's JIT plants were discovered to be more profitable than non-JIT facilities, even when risk concerns were taken into consideration. It would seem from this that just-in-time (JIT) manufacturing works better than traditional techniques not only for risk mitigation but also for actual cost and revenue reduction. Thus, the study provides evidence for the efficacy of JIT procedures in improving overall manufacturing performance and supports the idea that JIT production is preferable in terms of both profitability and risk management.

Sakakibara, S., Flynn, B. B., & Schroeder, R. G. (1993) The study uses 41 U.S. plants in a variety of industries to validate a comprehensive instrument, addressing the need for strict measurement procedures in evaluating the impact of Just-in-Time (JIT) manufacturing. The study, which encompasses various roles within each plant and has a participation rate exceeding 60%, guarantees representation from both managerial and operational levels. It offers a theoretical framework with sixteen dimensions for just-in-time (JIT), offering a solid foundation for more study and the development of hypotheses. In addition to providing a methodological guide for operations management researchers and a useful self-evaluation tool for manufacturing managers to compare against industry standards, this validated instrument helps researchers evaluate JIT implementation and its relationship with plant performance.

Fullerton, R. R., & McWatters, C. S. (2001) Since the 1970s, worldwide competition has pushed the adoption of Just-in-Time (JIT) manufacturing with the goal of lowering costs and increasing operational efficiency. JIT is still widely used and has prompted numerous studies despite conflicting research results regarding its effects. A meta-analysis covering empirical research on JIT's direct relationship with performance from 1992 to 2008 identified knowledge gaps brought about by insufficient data and moderating factors. To address a variety of practices and measurement approaches, it proposes investigating the effects of simultaneous or sequential JIT implementation and providing clarification on JIT conceptualizations. It advocates for a more nuanced understanding that goes beyond single-item measures. To fully understand JIT's effectiveness and applicability in a variety of scenarios, more research is required.

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Singh, G., & Ahuja, I. S. (2014) Manufacturing organizations must prioritize quality, availability, maintainability, and reliability in their systems due to increased global competition. JIT's role in addressing competitive challenges was highlighted in a study that surveyed 60 organizations and focused on the implementation of JIT in medium- and large-scale Indian industries. The study demonstrates the importance of Just-In-Time (JIT) in enhancing manufacturing performance in the Indian context through a thorough questionnaire that has been validated by experts. It emphasizes how JIT affects crucial success factors and improves manufacturing performance, and how top management can help ensure successful implementation by providing frameworks, incentive programs, and resource allocation. The study highlights the potential of Just-In-Time (JIT) to improve organizational competencies in the face of dynamic market environments.

Huson, M., & Nanda, D. (1995) The lack of empirical research on the relationship between JIT manufacturing and accounting performance metrics and how it affects firm value creation. The process of gathering data involved obtaining JIT adoption dates from a variety of sources, such as trade journals, newspapers, and direct company questionnaires. Adoption of JIT

III. RESEARCH METHODOLOGY

NATURE OF RESEARCH

This research is empirical and analytical in character. Real-world data must be gathered and analyzed in order to reach insightful findings. Through the use of organized and systematic data collection techniques, the study aims to provide answers to specific research questions or test hypotheses. Surveys, tests, observations, or the examination of pre-existing datasets may be included. The objective is to find patterns, connections, and trends in the data so that the topic under study can be understood more thoroughly. Because the conclusions are supported by empirical data, they have more validity and dependability. The research is also analytical in that it requires reasoning, interpretation, and the use of statistical or other analytical methods to analyze the data that has been gathered. Overall, this study tries to advance knowledge in a given topic by offering findings and insights supported by data.

RESEARCH DESIGN

Research involves a planned approach to unravel the mystery or unexplained. A researcher has to plan his work in advance so as to anticipate any obstacles in the course of research. Such a plan would also help the researcher to make decisions relating to sample size, the type of data to be collected, the analytical tools to be applied, etc. Hence, a research design could be defined as the blueprint specifying every stage of action in the course of research. Such a design would indicate whether the course of action planned will minimise the use of resources and maximise the outcome. Research design is the arrangement of conditions for the collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure.

SOURCE OF DATA

The study was based on primary and secondary data.

- Primary data was collected through a questionnaire
- Secondary data was collected through company records and pamphlets of the company.

SAMPLING TECHNIQUES

The sampling technique used in this project is random sampling.

SAMPLING SIZE

The sample size of the study is 100.

PROCESSING THE DATA

The data collected were classified, analysed, tabulated and statistical tools used for processing the data were percentage analysis.

IV. RESEARCHMETHODS

DESCRIPTIVE VS ANALYTICAL

Descriptive research includes surveys and facts – finding enquiries of different kinds. The major purpose of descriptive research is description of the state affairs as it exists at present. In social science and business research, we quite often use the term ‘Ex post facto research’ for descriptive research studies. The main characteristic of this method is that the researcher has no control over the variable, he can only report what has happened or what is happening.

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Most Ex post facto research projects are used for descriptive studies in which the researcher seeks to measure such items as, for example, frequency of shopping, preference of people, or similar data. Ex post facto studies also include attempts by researchers to discover cause even when they cannot control the variables. The method of research has to use facts or information already available and analyse these to make a critical evaluation of the material.

ANALYSIS OF VARIANCE (ANOVA):

When the effect that one factor has on one dependent variable is studied, one – way ANOVA is used to compare the means of several different groups. It is a generalization of student's t- test which compares means of two groups. The null hypothesis that is tested with an ANOVA is that there is no difference between the group means, and a low p-value indicates that the null hypothesis should be rejected.

There are four basic assumptions used in ANOVA.

1) The expected values of the errors are zero.
2) The variances of all errors are equal.
3) The errors are independent.
4) They are normally distributed.

Here in the research only one way ANOVA is applied.

APPLIED VS. FUNDAMENTAL

Applied research aims at finding a solution for an immediate problem facing a society or an industrial/business organisation, whereas fundamental research is mainly concerned with generalisation and with the formulation of a theory. Gathering knowledge for knowledge's sake is termed fundamental research. Research concerning some natural phenomenon or relating to pure mathematics are examples of fundamental research. Similarly, Research studies concerning human behaviour carried on with a view to making generalisations about human behaviour are also examples of fundamental research. However, research aimed at certain conclusions facing a concrete or business problem is an example of applied research. Research to identify social, political or economic trends that may affect a particular institution, marketing research, evaluating research are examples of applied research. Thus, the central aim of applied research is to discover a solution for some pressing practical problems, whereas basic research is directed towards finding information that has a broad base of application and thus, adds to the already existing organized body of scientific knowledge.

QUANTITATIVE VS QUALITATIVE

Quantitative research is based on the quantitative measurements of some characteristic. It is applicable to phenomena that can be expressed in terms of quantities. Qualitative research, on the other hand, is concerned with qualitative phenomenon, i.e.., phenomena relating to or involving quality or kind. For instance, when we are interested in investigating the reasons for human behaviour. We quite often talk of 'Motivation Research', an important type of qualitative research. This type of research aims at discovering the underlying motives and desires using in-depth interviews for the purpose. Other techniques of such research are word association tests, sentence completion tests, story completion tests and similar other projective techniques. Attitude or opinion research is i.e.., research designed to find out how people feel or what they think about a particular subject or institution is also qualitative research. Qualitative research is especially important in behavioural science where the aim is to discover the underlying motives of human behaviour.

ANOVA

Implementing JIT technology successfully and cutting lead times requires efficient production scheduling.

	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between group	14.590	4	3.647	3.445	0.011
Within group	101.628	96	1.059		
Total	**116.218**	**100**			

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Null Hypothesis (H0): There is no significant difference in production scheduling efficiency among different groups implementing JIT technology.

Alternative Hypothesis (H1): There is a significant difference in production scheduling efficiency among different groups implementing JIT technology.

INTERPRETATION

The ANOVA test reveals a significant difference in effectiveness and efficiency among different technology groups for purchase order and order processing ($F = 3.445$, $p = 0.011$). The substantial between-group variance ($SS = 14.590$) indicates notable variability attributed to group differences, suggesting diverse impacts of technologies on procurement processes. This underscores the importance of technology selection in optimizing operational performance.

Real-time data analytics used in production scheduling enables more accurate decision- making.

	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	24.536	4	6.134	6.402	0.000
Within Groups	91.979	96	0.958		
Total	**116.515**	**100**			

Null Hypothesis (H0): There is no significant difference in effectiveness and efficiency among different groups (technologies) for purchase order and order processing.

Alternative Hypothesis (H1): There is a significant difference in effectiveness and efficiency among different groups (technologies) for purchase order and order processing.

INTERPRETATION

The ANOVA results indicate a significant difference in effectiveness and efficiency among different technology groups for purchase order and order processing ($F = 6.402$, $p < 0.001$). The substantial between-groups variance ($SS = 24.536$) underscores notable variability attributed to group differences, implying diverse impacts of technologies on procurement processes. These findings reject the null hypothesis, suggesting that at least one group mean significantly differs from others, emphasizing the importance of technology selection in optimizing operational performance.

just-in-time technology works to help us find and cut out non-value-added tasks from our order processing?

	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	16.437	4	4.109	3.265	0.015
Within Groups	120.810	96	1.258		
Total	**137.248**	**100**			

Null Hypothesis (H0): There is no significant difference in effectiveness and efficiency among different groups (technologies) for purchase order and order processing.

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Alternative Hypothesis (H1): There is a significant difference in effectiveness and efficiency among different groups (technologies) for purchase order and order processing.

INTERPRETATION

The ANOVA results suggest a significant difference in effectiveness and efficiency among different technology groups for purchase order and order processing ($F = 3.265$, $p = 0.015$), indicating that at least one group mean differs significantly. The substantial between-groups variance (SS = 16.437) emphasizes notable variability attributed to group differences, while within-groups variance (SS = 120.810) reflects variations within each group. These findings support rejecting the null hypothesis and highlight the importance of technology choice in procurement processes.

I think just-in-time technologies have improved our purchase order and order processing procedures in terms of effectiveness and efficiency?

	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	18.824	4	4.706	3.986	0.005
Within Groups	113.335	96	1.181		
Total	**132.158**	**100**			

Null Hypothesis (H0): There is no significant difference in the improvement of purchase order and order processing procedures in terms of effectiveness and efficiency among different groups utilizing just-in-time technologies.

Alternative Hypothesis (H1): There is a significant difference in the improvement of purchase order and order processing procedures in terms of effectiveness and efficiency among different groups utilizing just-in-time technologies.

INTERPRETATION

The ANOVA results ($F = 3.986$, $p = 0.005$) indicate a significant difference in effectiveness and efficiency among various purchase order and order processing technologies. The significant F-value suggests that technology choice impacts procurement processes. The lower within-groups variance (SS = 113.335) compared to between-groups variance (SS = 18.824) underscores the importance of technology selection in enhancing operational performance. Therefore, rejecting the null hypothesis suggests that just-in-time technologies likely contribute to improved effectiveness and efficiency in procurement processes.

SUGGESTIONS

To effectively upgrade Flipkart's Just in Time (JIT) technology, it is essential to first conduct a comprehensive assessment of the current systems to identify technological gaps, outdated infrastructure, and potential integration challenges. Cloud-based solutions should be prioritized, offering scalable infrastructure without heavy upfront costs. Ensuring proper employee training is crucial for successful adoption of new systems, so investing in detailed training programs is vital. Additionally, technologies that allow real-time tracking of inventory and production should be integrated to optimize the JIT model. Regular maintenance and strategic outsourcing of IT support will help minimize disruptions and control costs, ensuring the technology infrastructure remains robust and operational.

V. CONCLUSION

In conclusion, the data presented highlights key demographics and employee perceptions relevant to the implementation of Just-in-Time (JIT) methodologies within the organization. It underscores the importance of understanding organizational needs and challenges in procurement, inventory management, production scheduling, and order fulfillment. The suggestions provided offer practical steps for upgrading technology infrastructure to support JIT operations effectively, emphasizing the need for thorough assessment, employee training, investment in scalable cloud technology, and seeking funding opportunities. By prioritizing upgrades that align with JIT principles and leveraging

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advanced technologies for real-time tracking and process optimization, the organization can enhance operational efficiency and responsiveness to meet evolving market demands. However, careful planning, maintenance, and ongoing support will be essential to ensure the success and sustainability of technology upgrades in facilitating JIT practices

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