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HANDLOOM MACHINE PRODUCTIVITY: A REVIEW

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ABSTRACT
Clothing is an essential human need, second only to food. The textile sector in India is gaining international renown. One of the most labor-intensive small cottage businesses in India is the handloom sector. In addition to being a viable source of income, it has preserved a wide range of traditional skills that, when combined with agriculture, provide low-interest jobs to rural residents. The handloom weavers are in a terrible situation owing to several issues and are continually losing money, despite multiple government initiatives that have provided them with institutional support and direct financial aid. In this article, we will discuss the factors that influence a handloom's production and provide some suggestions on how to improve it.

Keywords: productivity, handloom, machine, weaving.

INTRODUCTION
An integral part of India's rich cultural heritage is the handloom industry, which has a long history of producing high-quality goods. The gracefulness of Indian hand spinning, weaving, and printing has brought them international renown [1][2]. Households, in which various family members engage in joint production, are the backbone of this business. Skills are passed down from one generation to another in these events, which take place in hundreds of cities and villages throughout the nation. Women and members of economically disadvantaged groups make up the majority of this sector's craftsmen, who hail from semi-urban and rural regions [3]. The industry is strong because of its plentiful and inexpensive labour, its use of local materials, its minimal capital investment, its distinctive artistry, and its increasing recognition by customers throughout the world [4][5]

It is difficult to overstate the importance of India's textile industry, which includes the handloom industry, to the country's economic growth. A bigger portion of India's GDP growth is attributable to the textile sector[6][7]. There will always be a market for apparel and other textiles since they are fundamental to human survival. When it comes to India's economy, the textile sector is major[8][9]. According to the Annual Report, 2018-19, Ministry of Textiles, Government of India, it presently accounts for around 7% of industrial output, 2% of GDP, and 15% of the country's export revenues. Crucially, this industry ranks second in India for job creation, behind only agriculture. More than 45 million people are directly employed by it, and a further 6 million work in related fields; among them, there are many women and members of Scheduled Castes and Tribes[10].

Unfortunately, these rural weavers are in danger of losing their livelihoods and perhaps their lives as a result of the fierce competition from looms and big industrial enterprises. Concerns about the handloom business are not the only ones. Some examples of these issues include a lack of funding, outdated technology, inadequate infrastructure, untapped markets, high raw material costs, and a general lack of understanding of other cultures [11]. If handloom weavers are to continue existing and even thrive, these issues must be addressed immediately. Thus, the purpose of this research was to conduct a literature analysis in order to identify potential elements that may enhance productivity, thus improving the livelihood and long-term viability of handloom weavers[12][13].

LITERATURE REVIEW
For this study, various literatures which have been conducted in India and outside India are reviewed and summarized as follows:

According to **Santu Durlov (2019)**, weaving is a skill that has stood the test of time all around the globe. The handloom sector is characterised by its reliance on manual procedures and is mostly located in rural areas.

Traditional Indian women's garments from West Bengal, such as the 'Sari,' are highly regarded globally for their handloom craftsmanship. This massive piece of art is crafted by skilled weavers by hand. Hand sorting of raw materials, dyeing, cutting, starching, loom treatment, thread arrangement, spindle insertion, and many more jobs are all part of the product creation process. A number of health and socioeconomic concerns were the focus of this investigation. situations faced by those who weave using handlooms. A total of 340 weavers were selected at random from various districts in West Bengal, with an additional 108 individuals from the same areas and with comparable socioeconomic backgrounds used as references. Additionally, a well-established standard questionnaire was used to examine the intricate job profiles of handloom weavers. The weavers, who belonged to all walks of life, were all from low-income backgrounds and suffered from a wide range of medical issues, including chronic pain, vision difficulties, respiratory issues, and more.

In his research, **Satyam Kumar (2017)** highlighted the significance of tiredness and its analysis to the total productivity of any system that incorporates both humans and machines. The high prevalence of WMSD among workers is a direct result of the high levels of risk, exhaustion, and lack of knowledge about ergonomic considerations in the workplace. The inconvenient and expensive nature of tiredness measurement tools is largely to blame for this oversight. Surface electromyography (SEMG) is the gold standard for measuring and analysing occupational tiredness, however there are numerous other evaluation methods to choose from. In the eyes of many everyday wagers, overhead strain is the main culprit when it comes to cervical-related diseases. In order to detect risk sooner and perhaps prevent permanent and irreversible damage, a tiny, portable, and affordable device may be used to analyse analysis of SEMG signals to quantify tiredness. Industrial sectors would see a proliferation of such economic gadgets, which would boost production speeds while also protecting workers from harm. This message outlines the capabilities and constraints of all currently available devices and apps. We provide a new gadget that fixes most of the problems with the old one

In their study, **Weijie Shen et al.(2014)** reviewed dimensional analysis and its theoretical foundations, highlighting its possible statistical uses in areas such as experimental design and regression analysis. It is necessary to do research on several other matters. It is essential that the dimensional analysis give further thought to the error structure first. Additionally, we must investigate robustness and latent error variables. Next, the matching design on the untransformed quantities is not unique after the transformed dimensionless numbers have been developed. Multiple operational variable designs provide an opportunity to statistically examine Buckingham's Π-theorem's validity.(4)

According to **Kasper Edwards et.al (2014)**, there are several methods to accomplish the long-standing goal of the profession of making sure that when production systems are being designed or redesigned, both productivity and employee well-being are taken into account. In view of some research initiatives at DTU, this paper highlights critical concerns that must be resolved, particularly by those accountable for easing design processes. It is necessary to answer four primary questions: Identifying stakeholders with a stake in the system and what they bring to the table during design is step two. Handling various forms of process knowledge is step three. Leadership, key performance indicators (KPIs), and performance management systems are all aspects of system design that require attention. The research demonstrates, via the provided examples, that information is available to assist facilitators of system design in addressing these core concerns.

To measure the success of a company, **Machek Ondřej et al. (2012)** said that total factor productivity (TFP) is a useful metric. Companies in the power distribution industry, for example, employ TFP in both their competitive and regulated operations. The purpose of this research is to examine the TFP technique in regulated and competitive business settings, focusing on its foundations, differences, causes, and potential shortcomings and misunderstandings of the findings. The concepts of rate control and the seemingly incompatible nature of competition are addressed in the first section. We then introduced TFP and its ways of measurement. Following this, the goals of implementing TFP in both competitive and tariff-regulated sectors were outlined. Take a look at how regulated businesses are different from competitive ones in terms of productivity. For survival in the market, competitive enterprises aim to boost productivity above the industry norm. In many cases, their exclusive focus is

on organizational-level labour productivity. There are regulatory limits, not competitive forces, that regulated enterprises must contend with. In spite of Indian handlooms' unique place in today's interconnected globe, the weaving business has failed to raise enough awareness about the risks to workers' health. Weavers face additional health hazards from stress and physical effort on top of the many others that come with weaving and related occupations. Therefore, the purpose of this study was to determine the risks to occupational health from weaving and related activities and to suggest solutions to these problems. These solutions include consolidating all materials into one central warehouse, using a weighting scale to count parts, rearranging the MCI order and bins to prevent obstacles, and switching to a direct conveyor system to reduce handling. The end result is a dramatic drop in yearly scrapping costs and an explosion in productivity and income.

Research by **Millie Lombardi (2012)** shows that in today's market, a true competitive differentiation is identifying which prospects and workers can provide value to your organisation. Today, assessment tools are sought after by many businesses for their ability to shed light on applicants' and workers' skill sets and talents, as well as for their predictive power in identifying future performance drivers. To better understand how 186 of the 200 organisations questioned by Aberdeen in April and May 2012 utilised assessments to enhance leadership, key employee performance, and recruiting quality, Aberdeen conducted the study.

According to **D. Battini et.al. (2011)**, there is a strong relationship between ergonomics and the methods used to develop assembly systems. Additionally, it offers a fresh theoretical framework for evaluating assembly system design difficulties using a concurrent engineering method, all while optimising workplace ergonomics. A fresh and comprehensive method for designing assembly systems that take ergonomics into account is what it's all about. Ergonomic evaluations (human diversity), environmental factors (i.e., absenteeism, employee turnover, workforce motivation), and technical factors (i.e., working hours and procedures) are all part of the suggested methodological framework. In the latter section of the thesis, the data and results from two actual industrial examples that used complex simulation software are presented. This is done to ensure that the technique and process are applicable and correct. Businesses that understand the link between assembly and ergonomics will find this work's methodological approach to be of great use. According to the framework, the approach stresses the need of analysing and categorising the layout configuration of the assembly system in connection to technical and environmental criteria.

The purpose of the study published by **Aki Pekuri et.al. (2011)** is to examine the overall level of productivity in the Finnish construction sector and to define key terms associated with productivity. In an effort to gain insight into current practices and identify areas for improvement, this research surveys the literature on performance and productivity management. According to the study findings, the construction sector in Finland has had a slow rate of productivity improvement compared to other top industries in the country and even certain overseas competitors. This is based on the macro-level analysis that was conducted. When it comes to finding improvement objectives and control activities, productivity is not a good metric, according to a more thorough examination of performance metrics in the construction sector. More stringent steps should be taken to guarantee up-to-date and appropriate data. Lastly, the research highlights the disconnect between theoretical frameworks and real-world applications, which hinders organisations' ability to adopt contemporary measuring techniques. If construction industry managers are serious about boosting their companies' bottom lines, they should read this report and consider its suggestions for best practices.

A study was conducted by **M. M. A. Khan et.al. (2008)** to evaluate the impact of five elements on productivity: man, machine, material, money, and safety. Small metal businesses that make independent, unique goods were the only ones included in this research. Workshops in the welding, repair, and sheet metal industries were the subjects of 18 case studies. Based on the total productivity model (TPM), the research model was developed. The most significant obstacles to increasing product and material productivity, and by extension, the organization's total productivity, were identified to be a lack of trained employees, inappropriate material utilisation, inefficient inventory management, an inadequate safety package, etc. In addition, several methods for increasing output that have been refined by research and analysis are included.

According to research by **Soojung Jung et al. (2008)**, this report's study tests the premise that a metropolitan motorway system's system-wide peak productivity is greater when travel demand is moderate compared to when it's excessive. By combining statistics on traffic volume (count) and line-level speed, this effort's methodology characterises the overall system's productivity. When overall system capacity is closely matched with travel demand, the research found that highway fault situations lasted shorter and occurred less often, leading to improved productivity and efficiency at the system level. Reducing demand and mitigating congestion by pricing or other methods might recover the productivity lost on transportation systems and the time spent every day due to traffic jams.

In their study, **Paul H.P. Yeow et.al. (2006)** looked at the effects of using subjective evaluation (via questionnaire), direct method observations, and archival data on the productivity, quality, revenue, and scrapping costs of manual component insertion (MCI) lines in a printed circuit assembly (PCA) factory. On manufacturing lines, real-life tests were conducted. Long material searches in warehouses, inefficient part counting by hand, insertion obstacles, parts falling out when moving the PCA board on the U-shaped conveyor, etc. were among the eleven issues discovered. Steps were made to address the issue.

Subjective productivity measurement (SPM) was identified by **Riikka Antikainen and Antti Lonnqvist (2006)** as a method of measuring productivity that gathers data via interest group interviews or questionnaires. An SPM approach called "Knowledge Work Productivity Assessment" (KWPA) is detailed in this paper. Its primary function is to assess output in companies that rely heavily on the exchange of information. Possible issues with productivity variables and development objectives might be found using KWPA. A number of interviews with workers and a questionnaire make up the survey. When it comes to productivity, questionnaires are good for getting a general idea of things, but in-depth interviews reveal a lot more.

The purpose of the study by **Ashraf A. Shikdar et.al. (2003)** was to examine the relationship between worker satisfaction and productivity in a repetitive manufacturing task in the fishing industry. The researchers looked at the effects of performance or production feedback, production standards or goals, and monetary or wage incentives. Production standards, performance feedback, and financial incentives were some of the experimental factors used in an industrial research that aimed to quantify employee happiness and productivity. The satisfaction-productivity connection for the fish trimming job was only substantially modified by the participatory standard and the performance feedback condition. This condition was shown to have a very substantial positive correlation coefficient of 0.87. Finding a way to increase worker happiness and productivity in this kind of business is greatly affected by this. In most cases, employee happiness and output have increased as a result of production standards that include feedback. Workers' performance was already high before the monetary incentive, but it didn't make them any happier. Worker happiness and productivity were impacted differentially by the introduction of production standards, performance feedback, and monetary incentives, which in turn modified the worker satisfaction-productivity connection. Earlier research using identical experimental circumstances on participants (college students) failed to find a correlation between employee happiness and output.

According to **Derek-John Clements-Croome and Yamuna Kaluarachchi (2000)**, a pleasant workplace contributes to the user's happiness, creativity, and comfort. Investment in modernization decreases, sick days go down, production goes up, and comfort goes up—all thanks to a healthy environment. Worker productivity, happiness, and environmental comfort are all linked, and people react differently depending on their surroundings. While not always the case, the data demonstrated that office surroundings and work-related diseases are more common among people who report high levels of job discontent. A decrease in production is associated with dissatisfied employees, and a significant uptick in output is possible when people are healthy and happy. Overall contentment is expressed via well-being. No amount of contentment with one's work can compensate for a terrible work environment.

OBSERVATION

A summary of the available literature demonstrates that maintaining weaving traditions is crucial to the long-term viability of handloom-based rural economic development. Furthermore, there are a lot of issues plaguing the handloom business that require immediate action in order to improve the socioeconomic circumstances of weavers and the sector as a whole[14]. The literature study uncovered many important aspects, including the following: product development, social status, cultural promotion, product awareness among buyers and weavers, and institutional support. The weaver's socioeconomic position is elevated as a result of the increase in output[15].

CONCLUSION

Traditional weaving villages have seen significant socioeconomic hardship as a result of the handloom division's dwindling place in the global textile industry. Thousands of weavers have lost their jobs and several factories have shut down as a consequence of the handloom industry's steady decline over the last decade due to rising competition from contemporary textiles. The handloom's cultural and aesthetic significance ensures that it will continue to sell well, but the industry is demanding more from the handloom if it wants to keep its traditional significance and its place in the market.

Consequently, a marketing information system, a professional atmosphere, modernization of current resources, timely availability of all needs at an optimum price, and increased productivity should be the primary goals for the handloom sector's upliftment.

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