DIGITAL INNOVATION AND OPERATIONAL TRANSFORMATION IN TELANGANA TEXTILE ENTERPRISES

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ABSTRACT

The global textile industry is undergoing rapid transformation driven by digital technologies, shifting consumer preferences, and evolving market dynamics. This paper delves into the supply chain practices within the cotton textile export cottage industry of Telangana India with a primary focus on optimizing efficiency by addressing non-value-added activities. This study explores how digital platforms—particularly e-commerce, CRM systems, and digital marketing tools—enhance operational efficiency, customer engagement, and market positioning for textile wholesalers. Grounded in the Technology Acceptance Model, Diffusion of Innovations Theory, and the Resource-Based View, the research identifies key drivers and barriers to digital adoption. A mixed-methods approach, incorporating focus groups, surveys, and industry reports, supports a comprehensive analysis. A case study of Company A demonstrates how digital tools can address sector-specific challenges, increase competitiveness, and support sustainable growth. Findings show CRM systems improve customer retention through personalised service, e-commerce reduces inefficiencies and broadens market reach, and digital marketing boosts brand visibility. By integrating behavioural, organisational, and strategic perspectives, this study offers actionable insights for textile wholesalers seeking to thrive in a digitally evolving economy. The textile sector is a suitable sector for countries that provide great benefits to the economies of countries and want to obtain low costs and high profits, especially in the ready-made clothing sectors. Therefore, this industry makes a significant contribution to each country's economy. Furthermore, technology is always evolving and renewing itself in all areas.

Keywords: *digital platforms, Innovations Theory, digital marketing, textile industry, textile export cottage industry of Telangana*

INTRODUCTION

In recent days India is emerging as the manufacturing hub of the world. Indians have proven that they can ahead in the field of information technology, automobiles, textiles and business process outsourcing in the last few years. Textiles industry plays a fundamental part of human life science since the beginning of civilization and the methods and materials used to make them have expanded enormously, paving way for innovations and inventions. In textile industry operational efficiency is the backbone and is to be measured to achieve a strong long lasting and growth oriented results, whether to be in a developed country or developing country. With the help of operational efficiency in textile industry waste can be minimized and resource can be maximized for providing quality goods and services to consumers. The textile industry is a significant contributor to many national economies. The Indian textile industry is no exception to this. It occupies an unique position in the Indian economy in terms of its contribution to industrial production, employment and exports. A recent systematic review collected and synthesized definitions offered by eleven authors. From the eleven definitions, key issues central to digital transformation are digital technologies, processes, and change. Therefore, we define digital transformation as the necessitated changes in processes, whether business organizations or societies, usually driven by technological advancements, primarily digital

technologies. The SSI Survey postulates that for a firm to be effective in the innovation process, a conducive environment that consists of an effective support infrastructure of actors is critical. Connectivity between them that is fluid and dynamic will be pivotal in aiding access to the requisite, knowledge, skills, and resources. Hence, the survey aimed to map the innovation capability of manufacturing firms to such actors and institutions of sector-specific systems of innovation and also regional systems of innovation, and national systems of innovations. The humanistic, harmonious development of the human personality is a strategic goal of spiritual production, a powerful branch of which is the education system. Education is a well-established process of transferring, processing and acquiring knowledge in the course of systematically organized training of a group of people over a certain period of time. The advent of digital technology in the realm of textiles and clothing has served as a useful and innovative method for the textiles sector to make a mark in this rapidly evolving digital landscape. The desire to beat fierce competition from the bigger and more established players in the industry could not find a better answer than in the digitally smart clothing applications. The abundance of smart textiles and clothing accessories such as digital watches and glasses and clothes fitted with sensor devices are all beneficial and novel ways in which the process of digitalization could prove to be helpful for human being. The ability to track one's body temperature, pulse rate, respiration count, blood pressure, energy level and the intensity of physical activity undertaken on a daily basis and likewise other such useful facets about one's body are all but imperative for one to stay healthy in this era of rising non-communicable diseases.

LITERATURE REVIEW

Dam Tri Cuong (2024) The fashion industry has gained recognition for its significant impact on society and the environment, particularly in terms of waste generation. Currently, a substantial amount of clothing is discarded due to consumers' frequent purchases of new items and the disposal of perfectly usable ones. Adopting second-hand clothing (SHC) is recognized as an impactful measure in tackling textile waste and decreasing pollution. As a result, the Bayesian linear regression technique is used in this research to examine the determinants that affect customers' interest in purchasing SHC. A Google form was used to gather information for the research from 274 customers in Ho Chi Minh City, Vietnam. The findings showed five significant characteristics that substantially affect consumers' interest in purchasing SHC, with frugality being the most important element. Attitudes toward SHC, environmental awareness, subjective norms, and perceived behavioral control were also shown to be relevant determinants.

Idowu Jamiu Diyaolu (2023) This study focuses on the digital transformation of the textile and fashion design industry of developing countries in the Global South. Its goal is to describe the state of the art and determine the topical trends, challenges, and opportunities associated with the digital transformation of the textile industries in the Global South. We conducted a scoping review of 16 studies and followed the Preferred Reporting Items for Systematic Reviews and Meta-analysis and Scoping Reviews Protocols (PRISMA-ScR) guidelines. The search string was composed, and searches were conducted on some selected digital libraries and databases. We summarized each study and analyzed it based on emerging commonalities. We performed quantitative and qualitative analyses of the included studies. The results reveal

that transition to sustainable and smart production is an ongoing slow process in the textile and fashion design industry in the Global South. Textile production is embracing Industry 4.0 in practice based on intelligence systems. The study can also be a reference for inspiring the digital transformation of the textiles and fashion industry in developing countries, Nigeria in particular.

Pekka Neittaanmäki (2022) the textile and apparel (fashion) industry has been influenced by developments in societal socio-cultural and economic structures. Due to a change in people's preferences from economic functionality to supra-functionality beyond economic value, the fashion industry is at the forefront of digitalization. The growing digitalization in the fashion industry corresponds to digital fashion, which can satisfy the rapid shift in consumers' preferences. This study explores the evolving con-cept of innovations in digital fashion in the textile and apparel industry. Specifically, it centers on the evaluation of Amazon's digital fashion initiatives, which have made the platform the United States' top fashion retailer. An analysis of the business model of Amazon's digital fashion business showed that with the advancements in artificial intelligence (AI) powered by advanced Amazon Web Services (AWS), Amazon has introduced novel digital solutions for the fashion industry, such as advanced digital fashions (ADFs), on-demand manufacturing, neo-luxury, and, ultimately, cloud-based digital fashion platforms, that is, a supra-omni channel, where all stakeholders are integrated, and their activities are visible in real time.

Gautami Tripathi (2021) Fashion and textile industry are one of the fastest growing sectors that involves a complex supply chain at local and global levels to procure raw materials and supply finished products to the market. With key characteristics like decentralization, immutability, consensus etc., block chain technology has the potential to enhance the exiting fashion industry by adding an extra layer of security and trust to it. One of the major challenges faced by the fashion industry is the counterfeit products flooding the market place. These fake products have a negative impact on the brand image and value. Block chain has the ability to protect and secure the digital identities and establish authenticity in fashion industry. Despite of the exponentially growing popularity and interest in this technology, very little is known about the current state of application and use of block chain in fashion and textile industry. This paper discusses the various aspects of the use of block chain technology in the fashion and textile industry highlighting the benefits that block chain could bring. Further, the work also discusses the challenges in the integration of block chain into the existing processes of the fashion and textile industry.

Kanupriya (2020) This study discusses and analyses the complex relationship between digitalization and the Indian textile industry. It is found that the process of digitalization has both positive and negative impacts on the sector, in terms of its opportunities and supposed challenges. To effectively meet the challenges and convert these into opportunities, it is proposed that certain measures be taken of the likes of protecting the jobs of the poor and imparting adequate digital skills to the textiles workforce. To make the digital economy a success and not a disaster, it is imperative that digitalization be supported by an effective information and communications technology (ICT) infrastructure, involving both the state efforts and individual initiative. A visionary and practical approach to the issue of digitalization

shall render not only the industry but also the economy in an advantageous position, given the pre-eminence of the digital technologies in the world today.

Genesis of National Digital Tourism Mission

Hon'ble Prime Minister, while reviewing the progress of National Digital Health Mission suggested a similar initiative be taken up for Tourism Sector. The efforts are accordingly being made by Ministry of Tourism and MeitY to collaboratively explore the possibilities of developing a Unified Tourism Interface, for seamless exchange of information amongst the stakeholders of the tourism ecosystem. Such a Unified Tourism Interface would enable an open and interoperable network for search, discovery, information exchange and digital transactions which can herald the next generation tourism services. This interface is envisaged to enable both private and public solutions and applications to become a part of the tourism eco-system.

Applications in Textile and Fashion Manufacturing

3D printing enables fashion designers and retailers to create personalized clothing design, enrich designer's design requirements, ensure shorter lead-time and reduce material wastage compared to the conventional manufacturing process and enhance product quality. Besides, 3DP technique enables designers to apply computer aided design and fabrication to produce complex as well as flexible structures. 3D printed textiles are now extensively used have in the aerospace, medical and food industries. Besides, 3D printing will make it easier for the designers, manufacturers and retailers to respond quickly to the consumers by designing a sustainable supply chain. The continuous research progress on combining soft fibers with filaments will steadily increase the acceptance of 3D printed products among consumers. The 3D printed add-on part can be used extensively in producing athletic footwear, smart clothing laced with sensors, sports gears and medical textiles. 3DP can also be used to produce fire gears and other protective clothing.

Technology has changed the textile industry

Digitization in the textile and apparel sector is helping to streamline processes by enabling companies to use only the assets they need, when they need them, as well as enabling them to manage demand. These assets can be centralized and managed from a single location, which helps to streamline processes by reducing the need for on-site resources and manual data entry. Digitization is also helping to streamline processes by reducing the need for manual work, such as measuring and folding fabric, so that employees can focus on more important tasks. One of the key advantages of digitization in the textile and apparel industry is that it helps to reduce costs. This is due to a reduction in the need for on-site resources, a reduction in the number of warehouses needed, and a reduction in the need to print paper-based documents. The reduction in the need for on-site resources means that companies don't need to employ employees to manage various processes.

Industrial Revolution and Textiles

Textiles have been identified as the catalyst of technological changes. The application of steam power stimulated the demand for coal. The demand for machinery and rails stimulated the iron industry. The demand for transportation to move raw material in and finished products out stimulated the growth of the canal system, and (after 1830) the railway system. The introduction of steam power fueled primarily by coal, wider utilization of water wheels, and

powered machinery in textile manufacturing underpinned the dramatic increases in production capacity. The development of all-metal machine tools in the first two decades of the 19th century facilitated the manufacture of more production machines for manufacturing in other industries. The effects spread throughout Western Europe and North America during the 19th century, eventually affecting most of the world. Thus, the major technological advances associated with the Industrial Revolution were concerned with spinning. James Hargreaves created the spinning jenny, a device operated by hand that could perform the work of a number of spinning wheels.

METHODOLOGY

Textile industry in India is the second largest industry after agriculture providing employment to over 45 million people which significantly includes women work force and is considered as largest source of employment generation. India is one of the largest producers of textiles and garments. Abundant availability of raw material in the form of cotton, silk and wool have made the country a hub for textile manufacturing. The Indian textile industry represents a rich and diverse spectrum with hand woven sector at one end and capital-intensive mill sector on the other. The spectrum also includes decentralized Powerloom sector, hosiery, knitting and handicraft segments. It also includes variety of fibres ranging from natural fibres like cotton, wool, silk and jute to man-made fibres like polyester, rayon, nylon and lycra etc. Tradition and Change in Telangana emphasizes folk art forms and textile production and its changes that have taken place in the geographical regions of Telangana and Andhra Pradesh. Textile is a woven material and it can be made from any number of fibers or combinations of fibers, such as cotton, wool, silk, or synthetic fiber, the glass, nylon, etc Folklore essentially represents the villages. . Majority of the traditions, village-affairs, and the language traditions have been kept alive and are still prevalent. In this case, Textile Art,' Weavers and artisans has been successful in continuing to protect their art.

RESULTS AND DISCUSSIONS

The list of advantages mentioned was agreed upon by a majority of the respondents. Convenience and time savings are the factors that added to the value created for the customers via digitalization. Cost savings was also another factor that was agreed upon by around 90% of the respondents. The face-to-face interviews with the customers also 0% 20% 40% 60% 80% 100% Time Savings Convenience Cost Savings Saves Effort 95.93% 99.18% 89.02% 73.17% Advantages of Operating Digitally Percentage of Respondents 158 conformed to the above results. Digitalisation also adds to the saving efforts of the customers, thereby adding more value to the goods and services that they order.

Table 1: Which acts as a major advantage for you when operating digitally?

	Number of Respondents	Percentage of Respondents
Time savings	236	95.93%
Convenience	244	99.18%

Cost Savings	219	89.02%
Saves Effort	180	73.17%

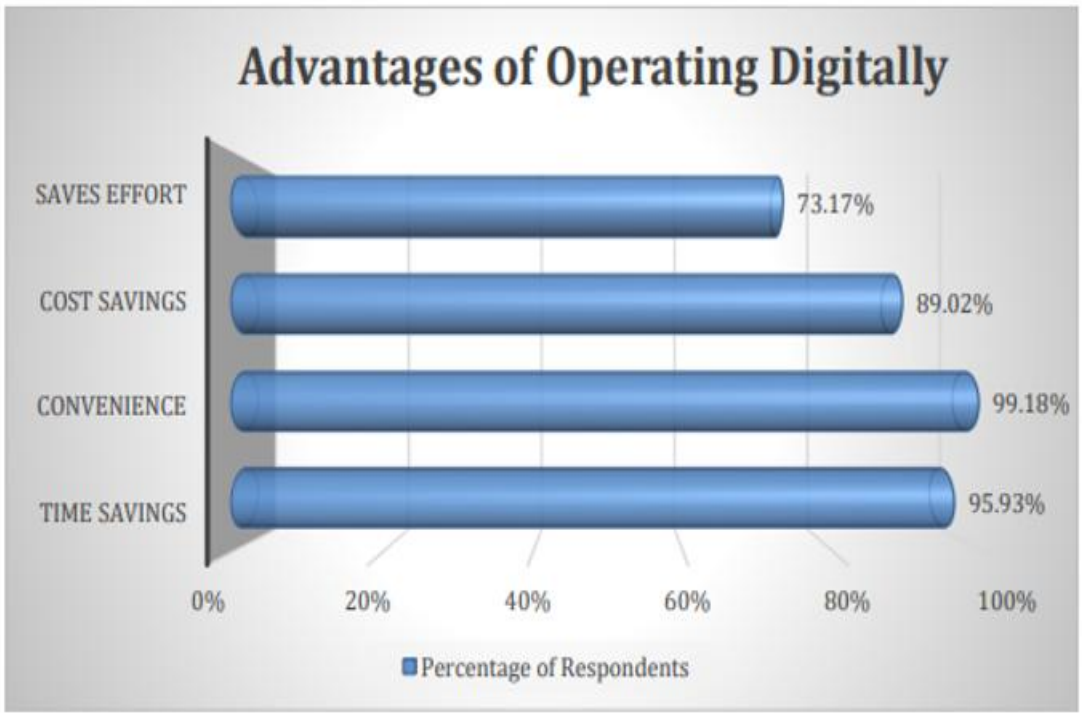

Figure 1: Advantages of Operating Digitally

Reasons for opting for digital platforms in your daily lives

Table 2: What instills you to opt for using digital platforms in your daily lives?

	Number of Respondents	**Percentage of Respondents**
Cash back offers	59	23.98%
Heavy discounts	84	34.14%
Flexible payment options	167	67.88%
Return policy	79	32.11%
Prompt delivery	39	15.85%
Cash refund	39	15.85%

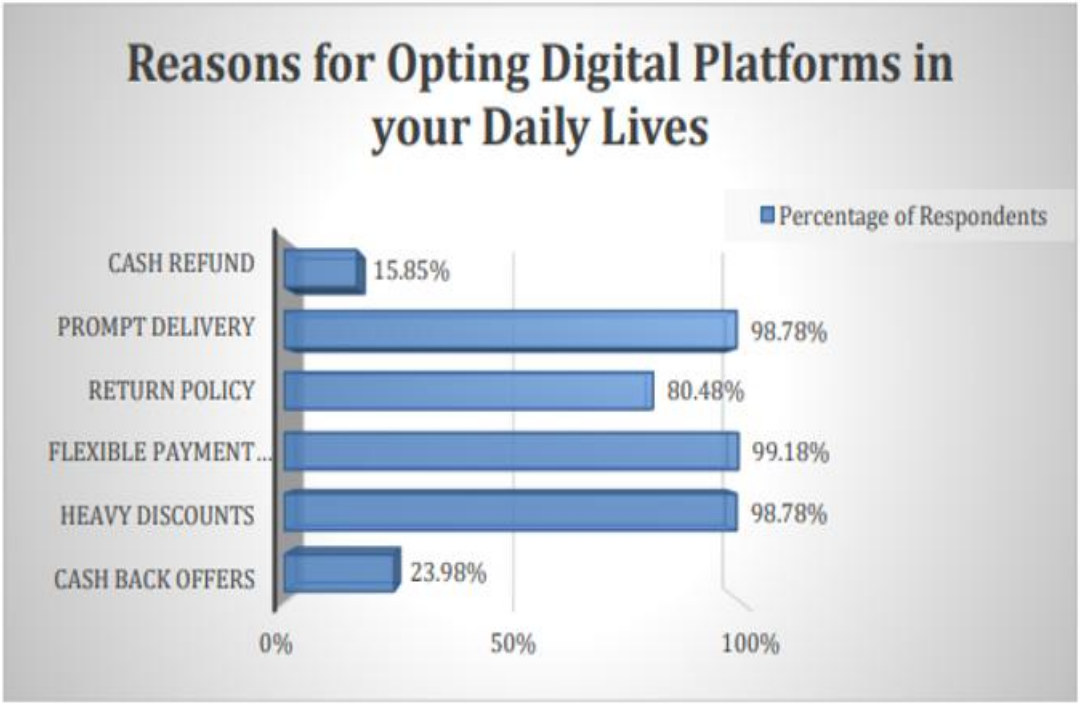

Figure 2: Reasons for opting for digital platforms

Another multiple-choice question was asked from the customers to examine major reasons for opting digital platforms in their daily lives. Some of the repeated items were selected and asked in the questionnaire. Among the items mentioned, flexible payment options came to be the foremost reason why digital platforms are opted by the customers. With economic changes like the implementation of demonetization, and the advent of the pandemic, there is a sudden rise in the inclusion of digitalisation in our 0% 50% 100% Cash Back Offers Heavy Discounts Flexible Payment … Return Policy Prompt Delivery Cash Refund 23.98% 98.78% 99.18% 80.48% 98.78% 15.85% Reasons for Opting Digital Platforms in your Daily Lives Percentage of Respondents daily lives; and the availability of flexible payment options has become a necessity. The option of prompt delivery and availability of discounts further adds to the value for the customers, which is possible only through digitalization.

CONCLUSION

The textile industry has historically been one of the strongest pillars of Telangana's economy, providing substantial employment, especially in rural areas, and contributing significantly to the state's industrial growth. However, growing global competition, rapidly changing market trends, and increasing customer expectations have highlighted the need for modernization and technological transformation. This study focused on understanding the evolution of digital technology within the textile sector of Telangana and evaluating its impact on productivity, competitiveness, and socio-economic development. The findings of the study clearly indicate that digital transformation has gradually emerged as a key enabler for the industry's growth. Small and medium-scale enterprises, once hesitant due to financial and technical constraints, are now recognizing the long-term benefits of digitalization, such as increased market reach through e-commerce and improved efficiency through automated processes. Despite these positive advancements, the study also reveals persistent challenges. Many rural textile units

lack awareness, affordability, and accessibility to high-end technologies. Digital skill gaps among workers remain a major concern, limiting the effective utilization of installed technologies. Further, infrastructural constraints such as limited broadband connectivity in certain regions hinder seamless digital adoption.

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