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A Study On Customer Expectation Techniques And Challenges Of Quality Control In Yarn Production.Ennar Spinning Mill, Coimbatore.

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ABSTRACT: The textile industry in Tirupur, often referred to as the "Manchester of South India," has traditionally relied on printing methods such as screen, block, and rotary printing. However, with increasing demand for rapid, sustainable, and high-resolution outputs, the industry is experiencing a significant transformation through digital textile printing (DTP). This study explores the socio-economic background of employees, evaluates the shift from traditional to digital methods, and analyzes the advantages and challenges of adopting digital printing in the local industry. Using descriptive research methodology and a sample of 150 respondents, the research highlights the positive impacts of digital printing on productivity, customization, and environmental sustainability. Statistical tools such as Chi-square tests, ANOVA, and T-tests reveal age and area of residence as key demographic variables influencing perceptions of digital printing. Despite its benefits, challenges such as high initial costs, color accuracy, and the need for skilled training persist. The study concludes that successful adoption of DTP in Tirupur hinges on investment in technology and workforce up skilling to ensure long-term sustainability and competitiveness in global markets.

Index Terms; Digital Textile Printing, Traditional Printing, , , Color Accuracy, Employee Perception.

INTRODUCTION:

Printing process like screen printing block printing, and rotary printing. These methods are integral for the making of quality garments used in international markets. But, due to high setup cost, long lead the textile industry in Tirupur is commonly known as the Manchester of South India. The area is well-known for its garment manufacturing and export, particularly in knitwear. For many years, the area has been famous for its old ways of textile time, higher water and chemical usage, the traditional means have limitation. Digital printing

technology has emerged as a game-changer in recent years and promises to overcome many challenges associated with traditional processes. Digital printing technology has transformed the textile industry all over the world with inkjet technology. This technology makes it possible to print directly on the fabric without the use of screens or plates. DTP technology directly prints on fabric using special inks and a computer. There are many advantages with this faster delivery, less wastage, lower water consumption and more choices in designs.

STAETMENT OF THE PROBLEM:

The textile industry has seen a lot of changes over the years especially with the introduction of digital technologies. One of the biggest changes has been the printing process from traditional to digital. While digital has many benefits such as design variations, speed and reduced environmental impact, going from traditional to digital is a multiple hurdle for textile manufacturers. The hurdles are the upfront investment needed for the equipment, need for technical people, integrating into existing production lines, reworking the supply chain to integrate digital workflow. And the viability of digital printing as a sustainable practice in the long run in terms of cost, quality and scalability has not been proven yet in many textile companies.

OBJECTIVE OF THE STUDY:

1. To know the socioeconomic background of employees
2. Examine the transformation of textile printing from traditional to digital methods
3. Analysis digital printing enhances production speed and reduces lead times
4. To identify the challenge faced by the employees in new digital technology.

SCOPE OF THE STUDY:

The main scope of the study is to understand the transformation of textile printing industry to a digitalize way of printing. It covers the main areas like technological innovations, benefits, challenges and future trends. It focuses on historical background of traditional printing to digital printing method .About high initial investments, as adapting to a new digital technology is a high risk of initial investment as the investment may be very high. Comparing of traditional printing and digital printing will be done in the study. To know more about the digital trends and how textile industries adapt to it.

RESEARCH METHODOLOGY:

Research design:

The research design may be viewed as a sole framework or plan of research for a study that guides the Collection and analysis of data. It will be descriptive in nature. Area of study: The study is undertaken in Tirupur city.

Sample size:

A sample size for this study is set to 150 respondents.

Sampling techniques:

Convenience sampling technique is used for the study.

Period of study:

The period of study is set for 4 months - that is January2025-April2025.

Methods of data collection:

Data was collected from respondents through a questionnaire

Source of data collection: Data was collected through both the primary and secondary sources. Primary data were collected through the questionnaire.

Primary Data:

A primary data is a data that is collected for the first time for interest about what more information needs to be gathered on it. Thus, for this study, the primary data was extracted by means of questionnaire.

Secondary Data:

In this study, secondary data was collected from other studies, articles, journals, and websites.

Statistical tools used for data analysis:

- Simple Percentage Analysis
- Chi-Square
- ANOVA
- T test

LITERATURE REVIEW :

Garcia, S., & Rodriguez, T. (2022) Garcia and Rodriguez explore the future of digital printing in fashion and textile production, focusing on its potential to reshape the industry. The paper addresses how digital printing is enabling faster, more flexible production processes, allowing for on-demand manufacturing, smaller batches, and personalized products. In fashion, this means quicker responses to trends and the ability to produce garments in smaller quantities, reducing overproduction and waste. The authors discuss the role of digital printing in advancing sustainability efforts in the fashion industry, with particular attention to reducing water, chemical, and material waste. The paper concludes by highlighting the challenges digital printing still faces in terms of print durability and cost-effectiveness, but predicts that with ongoing technological advancements, digital printing will become even more integral to fashion and textile production.

Lee, Y. (2022) Lee reviews the ongoing innovations in digital textile printing inks and substrates, which are critical for improving print quality and expanding the potential applications of digital printing. The paper discusses new types of inks, including reactive, sublimation, and pigment-based inks, and how each of these has been optimized for different types of fabrics. In particular, Lee discusses how pigment inks have been developed to print on a broader range of substrates, from synthetic fibers to natural fabrics. The review also highlights advancements in inkjet printer heads and their ability to handle these new inks, leading to better color accuracy, print durability, and enhanced resolution. As a result, digital textile printing is becoming more versatile, allowing it to meet the demands of a broader range of textile products, from fashion garments to home furnishings

DATA ANALYSIS:

ANOVA:

Relationship between digital vs. traditional printing and demographic profile.

Hypothesis

There is no significant difference in digital vs. traditional printing across demographic factors of the respondents.

ANOVA

Variables	Group	Mean	SD	N	t-Value	F-Value	Table Value	Sig.
Age	20-25 years	2.56	1.045	32	2.948	0.937	-	0.444
	26-30 years	2.53	0.943	17	-	-	-	-
	31-35 years	2.40	0.707	25	-	-	-	-
	36-40 years	2.20	0.813	41	-	-	-	-
	Above 40 years	2.31	0.932	35	-	-	-	-
Gender	Male	2.36	0.932	83	-	0.033	-	0.857
	Female	2.39	0.852	67	-	-	-	-
Education	High school	2.67	1.113	15	-	0.836	-	0.476
	Diploma	2.33	0.734	27	-	-	-	-
	Undergraduate degree	2.40	0.846	73	-	-	-	-
	Postgraduate degree	2.24	1.017	34	-	-	-	-
Department	Designing	2.24	1.136	21	-	0.363	-	0.835
	Pre-press	2.35	0.802	40	-	-	-	-
	Printing	2.29	0.624	24	-	-	-	-
	Fabric preparation	2.49	0.895	45	-	-	-	-
	Post-processing & Finishing	2.40	1.095	20	-	-	-	-
Income	Below ₹25,000	2.31	1.123	26	-	0.374	-	0.827
	₹25,000 - ₹50,000	2.42	0.839	45	-	-	-	-
	₹50,001 - ₹75,000	2.49	0.804	37	-	-	-	-
	₹75,001 - ₹1,00,000	2.26	0.764	27	-	-	-	-

	Above ₹1,00,000	2.27	1.100	15	-	-	-	-
Area	Urban	2.09	0.965	34	-	3.217	-	0.043
	Rural	2.35	0.840	60	-	-	-	-
	Semi Urban	2.57	0.871	56	-	-	-	-

CHI SQUARE:

Relationship between demographic profile and working comfort in digital printing

Hypothesis:

The Demographic profile of the respondents has no significant association with the working comfort in digital printing

CHI SQUARE

Demographic profile	**Chi-square value**	**Sig.value**
Age	12.67	*
Gender	4.32	NS
Income	8.91	NS
Education	3.45	NS
Region	15.23	NS

SUGGESTION:

A well-structured Color Management System ensures consistent color reproduction across different devices. Using ICC profiles helps standardize colors, while regular calibration of monitors, printers, and scanners prevents variations. Setting uniform color profiles in design software like Adobe Photoshop and Illustrator also plays a crucial role in maintaining accuracy. Routine printer calibration is necessary to maintain consistent color output. Using spectrophotometers and densitometers ensures color accuracy, while cleaning print heads and replacing worn-out components prevents color shifts.

Using OEM (Original Equipment Manufacturer) inks instead of third-party alternatives improves color stability. The choice of printing media also affects color output, so selecting high-quality substrates that are compatible with the printer and ink system helps maintain color consistency. Proper ink storage further prevents color degradation over time. Environmental factors like temperature and humidity can impact ink drying and color

consistency. A controlled printing environment, free from excessive moisture and direct sunlight, ensures predictable color reproduction. Maintaining stable conditions prevents unwanted shifts in color appearance. Regular test prints help identify and correct color discrepancies before final production. Comparing prints with Pantone color charts ensures accurate color matching. Using both hard proofs (physical samples) and soft proofs (digital previews) helps detect issues early in the workflow, minimizing errors and reprints.Soft proofing methods allow operators to preview colors before printing, reducing reprints and material wastage. Keeping uniform print settings across all projects further enhances consistency.

CONCLUSION:

Ensuring colour accuracy and consistency in the digital printing industry is essential for maintaining high-quality output, reducing production errors, and meeting customer expectations. Inconsistent colours can lead to increased material waste, higher production costs, and dissatisfied clients. To overcome these challenges, businesses must implement a Color Management System (CMS) that standardizes colors across different devices using ICC profiles and calibrated monitors, printers, and scanners. A well-structured CMS minimizes color shifts and ensures that the final print closely matches the intended design. Equally important is the training and skill development of staff. Well-trained print operators and designers can better understand color theory, calibration techniques, and the impact of substrates on color reproduction. Encouraging collaboration between designers and printing technicians ensures that color expectations are aligned and that potential issues are addressed before production. Ongoing training programs help employees stay updated with the latest advancements in color management technologies and industry best practices.

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