



# Role of Technology in Developing Indian Print Industry

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**Abstract:** Three-dimensional (3D) printing enables patient-specific anatomical level productions with high adjustability and resolution in microstructures. With cost-effective manufacturing for high productivity, 3D printing has become a leading healthcare and pharmaceutical manufacturing technology, which is suitable for variety of applications including tissue engineering models, anatomical models, pharmacological design and validation model, medical apparatus and instruments. Construction industry is very labor-intensive and one of the major sources of employment in the world. The industry is experiencing low productivity with minimum technological innovations for decades. In recent times, various automation technologies including 3D printing have received increasing interests in construction. 3D printing in construction is found to be very promising to automate the construction processes and have the potential of saving laborious work, material waste, construction time, risky operation for humans, etc. There has been a comprehensive body of research conducted to understand the recent advances, future prospects and challenges of large-scale adoption of 3D printing in construction projects.

**Keywords:** Print Industry, 3d Print, Digital Information

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## INTRODUCTION

The Indian Printing Industry has constantly evolved for the last 15 years. It has flourished at the rate of 12 percent a year after year which consists of 2,50,000 broad, moderate and compact printers. Hence mentioned below are the yearly estimation that has an effect on packaged printing business as its spreading 17percent yearly estimation, 10percent on monetary printing and 30percent increase in digital printing. Printina is one of the Printing & Product Development Manufacturer with a wide range of products, distributing its services from rural India to Metro cities. It has experience diversity in demand and supply, product patterns, Investment in various regions of India. The brief about it helps to put light on how, where & why the printing industry has become a booming business in the market relevant to other industries from Food to Beverages, to Commodity transport by all paths available i.e. sea, land, and air. If we look at India's Map you can imagine the way it has been developed. Printing Manufacturers in cities like Mumbai, Delhi, Punjab, Bangalore Kolkata, etc adapted themselves for cutting edge technology which is constantly upgrading and customer demands fluctuate, printing businesses can sustain and grow only when equipped with the latest technology.

## LITERATURE REVIEW

**Abid Haleem et. al. (2021)** For many years, 3D Printing technologies have created significant advancements in the fields of engineering and healthcare. 4D printing is also introduced, which is the advanced version of 3D printing. The process of 4D printing is when a printed 3D object becomes another structure due to the influence of outside energy inputs such as temperature, light, or other

environmental stimuli. This technology uses the input of smart materials, which have the excellent capability of shape-changing. The self-assembly and programmable material technology aim to reimagine building, production, assembly of products, and performance. 4D printing is applied in various sectors such as engineering, medicine, and others. 4D printed proteins could be a great application. With this new dimension, 3D printed objects can change their shape by themselves over the influence of external stimuli, such as light, heat, electricity, magnetic field, etc. This paper discussed a brief about 4D printing technology. Various characteristics of 4D Printing for enhancing the manufacturing domain, its development, and applications are discussed diagrammatically. Conceptualized the Work Process Flow for 4D Additive Manufacturing and finally identified ten major roles of 4D printing in the manufacturing field. Although reversible 4D Printing itself is a fantastic development, it is innovative, and it employs durable and accurate reversal material during the shapeshift. It helps us create complicated structures that cannot be accomplished easily by traditional manufacturing technologies. It seems to be a game-changer in different industries by depending on natural factors instead of energy and changes the way to produce, develop, bundle, and ship goods entirely.

**Yu Ying Clarrisa Choong et. al. (2020)** The global uncertainty created by the COVID-19 pandemic has plunged the world into a crisis that is still unfolding. Logistical challenges owing to disruptions in manufacturing and transportation, together with pushbacks against globalization and free trade, have constrained supply chains, resulting in critical shortages of essential goods. Healthcare systems are on a war footing to increase their capacity of beds, supplies and trained workers. Crisis-response efforts are in motion to alleviate shortages of much-needed medical supplies.

**Anna Aimar et. al. (2019)** Three-dimensional (3D) printing refers to a number of manufacturing technologies that generate a physical model from digital information. Medical 3D printing was once an ambitious pipe dream. However, time and investment made it real. Nowadays, the 3D printing technology represents a big opportunity to help pharmaceutical and medical companies to create more specific drugs, enabling a rapid production of medical implants, and changing the way that doctors and surgeons plan procedures. Patient-specific 3D-printed anatomical models are becoming increasingly useful tools in today's practice of precision medicine and for personalized treatments. In the future, 3D-printed implantable organs will probably be available, reducing the waiting lists and increasing the number of lives saved. Additive manufacturing for healthcare is still very much a work in progress, but it is already applied in many different ways in medical field that, already reeling under immense pressure with regards to optimal performance and reduced costs, will stand to gain unprecedented benefits from this good-as-gold technology. The goal of this analysis is to demonstrate by a deep research of the 3D-printing applications in medical field the usefulness and drawbacks and how powerful technology it is.

**Sílvia Manuela Ferreira Cruz et. al. (2018)** Printing technologies have been demonstrated to be highly efficient and compatible with polymeric materials (both inks and substrates) enabling a new generation of flexible electronics applications. Conductive flexible polymers are a new class of materials that are prepared for a wide range of applications, such as photovoltaic solar cells, transistors molecular devices, and sensors and actuators. There are many possible printing techniques. This chapter provides an opportunity to review the most common printing techniques used at the industrial level, the most commonly used substrates and electronic materials, giving an overall vision for a better understanding and

evaluation of their different features. Several technological solutions (contact/noncontact) and its critical challenges are also presented. Inkjet Printing Technology (IPT) has been receiving a great attention and therefore higher focus is given to this technology. An overview of IPT is presented to evidence its importance and potential as a key-technology on the research field for printed electronics development, as well as on large scale industrial manufacturing. A background and a review on prior work are presented along with used materials, developed applications and potential of IPT technology. The main features of the different printing technologies, advantages and main challenges are also compared.

**Yunguang Long et. al. (2017)** For both developed and developing countries, manufacturing plays a crucial role in international competition. There is a growing consensus that 3D printing (3DP) technologies will revolutionize the development of global manufacturing. Although considerable research has previously been conducted to define the technological and economic benefits of 3DP on global manufacturing, minimal research has linked 3DP with Chinese manufacturing (CM). Therefore, to address this research gap and to investigate 3DP's potential impact on alleviating CM's development issues, this paper explores the definition, characteristics and mainstream technologies of 3DP, presents the current situation and the main problems of CM, and analyses the potential impact of 3DP on the development of CM. Then, this study introduces the current 3DP promotion and industrialization situation in China as well as the issues with promoting 3DP in CM.

## **METHODOLOGY**

In order to exact data regarding the specification of the printing processes and the using of digital data and workflow systems, an extended survey among print media companies has developed and implemented. The survey took place in Hungary and included interviews and answers to a question.

The groups of questions are.

- Job preparation.
- How files and originals arrive?
- Digitalis workflow system.
- Color management.
- Pre-flighting.
- Proofs.
- Platemaking/Computer-to-plate.
- After the job is completed.
- Computer integrated production process.
- Digital printing.
- Digital asset management and servers.

The survey started in September of 2006 and ended in May of 2007. The questions has been distributed to 72 printing companies data have been obtained by 65 companies. The outcomes and results from the survey are presented in the chapter “Results” of this paper.

## **RESEARCH APPROACH**

There are 3 types of research; quantitative, qualitative and mixed research. Quantitative research is 'Explaining phenomena by collecting numerical data that are analysed using mathematically based methods.

## **RESEARCH DESIGN**

This study is exploratory in the sense that; it is an attempt to find what are the technological changes carried out by the printing industry in Kerala and what is happening to the management aspects by the influence of technological changes and descriptive in the sense the researches tries to explain the effect of technological changes in industry level and employee level. This study is longitudinal in nature which examines different events in a long period of technological progress in printing industries.

## **DATA COLLECTION METHODS**

### **Collection of primary data:**

questionnaire, interview, observation method

### **Collection of secondary data:**

The major part of the secondary data was collected form the past survey reports, books, journals, magazines, documents published by All India Federation of Master Printers, Kerala Master Printers Association and Kerala Printers Association, Government Documents etc. Published and unpublished data were collected from the industrial centers, the directorate of industries and commerce, the bureau of economics and statistics and state planning board. Published reports of both central and state government institution were also made use of. Data from research report, papers and journals, were also used. For studying the development of printing industry in Kerala secondary was used.

## **Sampling**

A systematic record of the Printing Industry in Kerala does not exist. As registration of small and micro industry is only optional many small industrial unit are found to be operating without registration. So the registered industries registered in government departments and unregistered industries that taken membership in Kerala printers association is taken as the universe. The total numbers of the presses in the above districts were first determined by cross checking the names and addresses of presses from the list supplied by Kerala Printers Association and the District Industrial Centers. It was however confirmed from the discussions with the local printers' association that the numbers of variable units were 2324.

## **Analysing Data**

This study is mainly a qualitative study. But some quantitative data are also used. Analysis mainly

consists of checking frequencies, measure of central tendency and dispersions. For processing the collected data, mathematical and statistical tools have been selected according to the requirements of the study. Mathematical tools such as averages, percentages, ratios, standard deviation, etc are used. Statistical tools like Friedman test is used for testing differences between '3 different phases' of technological upgradation. Wilcoxon signed rank test is used for testing differences between the conditions after 1st and 2 nd technological change.

## ANALYSIS

Details by the type of printing organisation are in the Table 1. The breakdown by size of company was quite typical of the overall printing industry (Table 2).

**Table 1: Respondents by Type of Printing Organization (as a present of all respondents)**

Type of Printing Organization	Number of Respondents	%, Respondents
General Commercial Printer	54	75,0
Prepress Service Bureau	3	4,2
Book Printer	3	4,2
Magazine Printer	3	4,2
Package Printer	2	2,7
Miscellaneous/no reply	7	9,7
	72	100

**Table 2: Respondents by Employees Size of Printing Organization (as a percent of all respondents)**

Size of Printing Organization	Number of Respondents	%, Respondents
1 to 9 employees	23	31,9
10 to 19 employees	14	19,4
20 to 49 employees	10	13,9
50 to 99 employees	11	15,4
100 to 249 employees	8	11,1
249 to 499 employees	5	6,9
> 500 employees	1	1,4
	72	100

## Printing Industry of India after Independence

Soon after independence, there was a greater demand for the printed material from different sectors of the society owing to greater political awareness, the large scale literacy program and development of commercial activities in the country. Among these the literacy program of the Government and other voluntary organization increased the demand for text books, journals, and other printed publication. This has resulted in the development of many publishing houses in different parts of the country making more room for the growth in the number of printing units. The formation of type foundries for different Indian languages helped in multiplying the printing units.

## CONCLUSION

The Case of this Odia-print-media is an interesting example of struggle and success. While newer establishments with smart technology and innovative approach have excelled in the market, many biggies, who failed to adapt to the changing market environment, have suffered heavily. Online readership, as evident from hit-rates, is increasing very fast and might surpass the print (hard) copy circulation very soon. The terms 3-D printing and AM have become inter-changeable. 3-D printing technology has been inexistence for over 30 years, but after the expiration of one of the technology's last patents in 2009, there has been tremendous industry growth as well as huge steps in advancing the technology to make its more efficient and cost effective. 3-D printing technology is still in its infancy and will require further advancements in technology including reducing costs of printers and printer material and increasing printer capabilities to be faster, more accurate, and work autonomously.

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