OPTIMIZATION OF QUALITY IN MEDIUM SCALE ENTERPRISES; A STUDY ON INDUSTRY 4.O

MARUTHI M V[1], Dr R SARVAMANGALA[2]
[1]*Research scholar Department of commerce, Bangalore University*
[2]*Department of commerce, Bangalore University*

ABSTRACT:
21st century is completely depending on technology each and every activity is regulated through technology. Quality is one of major issue in every sector with the help of advanced technology we are easily control quality of product. The aim of the paper is impact industry 4.O on quality of product and automation of machinery in the process of production. The paper is considering both primary and secondary data. Statistical data is analysed through regression and correlation methods for evaluate the results. The paper revels quality of the product is depending on advance technology using on manufacturing of process. Automation helps in increasing in productivity and efficiency. Industry 4.O is helping lot in operations of medium scale industry.
KEYWORDS: Quality control, Industry 4.0, Productivity and Optimum utilization.

Introduction:
Today, technology has become such an integral part that it has changed the definitions of physical, mental and social quality of life. The introduction of 'smart' technologies has been introduced in all aspects from phones to vehicles, forensics to legal courts, homes to industries etc. This has substantially reduced time and physical effort with easier processes.

The manufacturing industries have evolved their processes over the recent centuries which mark the development of the Industrial Revolution which began in the 18th century in Britain as the First Industrial Revolution where absolute human and animal power was replaced with water and steam power. The second Industrial Revolution happened in the 19th century with the introduction of assembly lines, the use of oil, gas and electric power accompanied by new power sources and advanced communication via telephone and telegraph which enabled mass production and a few automation to manufacturing processes. During the middle of the 20th century, the third industrial revolution began with advanced telecommunications, adding computers and data analysis to manufacturing processes. The digitization of factories began by embedding programmable logic controllers (PLCs) into machinery to help automation and data management. Presently we are in the 4th industrial revolution which is also called Industry 4.0. This phase has increased automation in all processes enabling more efficiency and productivity across the value chain which is accompanied by smart machines and smart factories. It integrates new technologies which include the Internet of Things, cloud computing, analytics, Artificial intelligence and machine learning into their processes. According to Henrik von Scheel, the Father of Industry 4.0 and a management thinker, "Industry 4.0 is the biggest structural change of the past 250 years- a transformation of scale, scope and complexity unlike anything humankind has experienced before".

As per the government of India, a business that has an overall investment between 5 to 10 crores is referred as a Medium Scale Enterprise. As per one of the estimates, MSMEs contribute 45% of the manufacturing production and 40% of the total exports in India. The government has formulated various policies in order to make this industry one of the significant sectors in the global market. The medium scale enterprises play a significant role in the overall economic development of India they also contribute towards employment and equality to the workforce as these enterprises are

mostly labour intensive. The support of automated technologies canboost optimization in this industry which has the highest potential of contributing to the economy.

The technologies that drive the industry are the Internet of Things, cloud computing, AI and machine, edge computing, and digital twin accompanied by cyber security which are the key to smart factories with equipped factory floors with sensors and web-enabled devices. The integration of engineering, supply chain, production, sales and distribution where, a large amount of data can be analysed for an efficient and cost-effective decision-making process along with better insights providing visibility, predictability and automation of operations andbusiness processes. This study concentrates on the use of the technologies of the Industrial Revolution that can have a significant impact on the optimization of quality in the processes inmedium-scale enterprises.

Statement of the problem

There has been a massive growth of medium-scale enterprises in India over the years. The Medium Scale Industries have a big role in meeting the sales and production requirements of small-scale as well as large-scale industries. They tend to be labour-intensive and thus providea great platform for more employment. With the ever-growing competition, it is essential for every business to be updated and evolve through processes. Thus, conventional method of production is more expensive and less quality of a product thus leads to reduction of productivity of the organisation. Artificial Intelligence is massively growing and has led everybusiness to a whole new level. While medium-scale industries have a significant role in the overall economic development of India, it becomes exceedingly important for them to be updated for the challenges in the era of Industry 4.0. Automation is the rule of the industry today thus, it forms the major aspect of this paper to study the level of automation implemented in Medium scale enterprises and if this can impact the quality of the production as compared to the conventional methods which in turn can affect the overall growth of the organisation.

Research Methodology

The current study is Empirical in nature. The sampling method adopted in this research paper is Purposive sampling. The data has been collected through a structured questionnaire administered to Employees of Medium Scale Enterprises located in Bangalore. The questionnaire was sent through a mail survey wherein, it was uploaded in Google Forms and the link was sent through the mail to all the respondents. It was sent to people of which, have filled out the forms. Sample size is 62, The study uses statistical techniques like Regressionand correlation for analysis.
Objectives

- To study the level of automation in Medium scale enterprises
- **To analyse the impact of automation on the quality of the product**
- **To study the impact of Industry 4.0 on the productivity of Medium ScaleEnterprises**

Scope of the Study

The scope of this paper covers the Medium scale enterprises, their level of Artificial Intelligence implemented and its effects on the quality of the finished product, and if it's present automation can scale up to the competition in the Industry 4.0. For this purpose the study takesthe responses of the employees of medium scale enterprises. This study also covers the effectsof industrial revolution on the Industry.

Limitations of the study:

- The study does not cover the technical analytics of Artificial Intelligence.
- The study does not explain the economic aspects of the Industry as a whole.
- The time frame taken for the study is limited.

Hypotheses:

- HO There is no impact of automation on quality of product.
- HO There is no impact of industry 4.0 on productivity.

Data Analysis:

Ho There is no impact of automation on quality of product.

Table: 1 Regression analysis

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.578ª	.334	.323	.406

a. Predictors: (Constant), Do you agree that digital automation simplifies all the processes in the organization?

Table: 2 Coefficients of variables
Coefficientsª

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.446	.329		7.441	.000
	Do you agree that digital automation simplifies all the processes in the organization?	.415	.076	.578	5.481	.000

a. Dependent Variable: Do you agree that digital automation improves the quality of the product?
In order to test first hypothesis, we used regression test to check the automation impact on quality of product. From the above first table showing R value is 0.578 that means automation impact on quality to the extent of 57%. and second table showing that significant value is 0.000is less than 0.05 hence reject the null hypothesis and accept the alternative hypothesis which state that there is impact of automation on quality of product.
Regression equation.Y= a+bx
Quality of Product= 2.446+ 0.415*A
Which means one unit change in level automation increase the quality of the product to theextent 41%.
Ho There is no impact of industry 4.0 on productivity of organisation.
Table: 3 Regression analysis
Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate

| 1 | sss.691^c | .477 | .450 | .429 |

a. Predictors: (Constant), Do you agree that digital automation improves the quality of the product?

Table: 4 Coefficient of variable on dependent variable
Coefficientsa

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.387	.533		2.601	.012
	Do you agree that digital automation improves the quality of the product?	.657	.125	.560	5.237	.000

a. Dependent Variable: The Industrial Revolution has improved the overall productivity of the organization

In order to test first hypothesis, we used regression test to check the automation impact on quality of product. From the above third table showing R value is 0.691 that means automation impact on quality to the extent of 69%. and fourth table showing that significant value is 0.000 is less than 0.05 hence reject the null hypothesis and accept the alternative hypothesis which state that **There is no impact of industry 4.0 on productivity of organisation.**
Y= a+bx
Productivity = 1.387+ 0.691*I
Which means one unit change in level automation increase the quality of the product to the extent 69%.

Managerial implications:
The study offers insights into the various factors involving in automation of MSME and automation of manufacturing of goods in modern technology. Industrial products which are raw materials for big industries. Study revels that major quality of a product is increase and efficiency of productivity. Implementation of industry 4.O which is major impact on productivity of the medium scale industries. The artificial intelligence-based automation influence on quality of product, and efficiency in manufacturing process. Government also take initiatives towards the development automation in medium scale industries by providing financial assistance and non-financial aid through various financial and non-financial agencies.
4.0 industrial revolution brings major changes in an infrastructure of manufacturing level thus reduce the wastages and reduce time taken to produce manufacturing of single unit. Artificial intelligence automation automatically increases the profitability of the medium scale industries. A complete automation brings smart industries in the modern Indian economy.

Conclusion:
Artificial intelligence is one of the major changes in the daily life of human being technology which bring more efficiency rather than conventional methods. Fourth industrial revolution brings smart medium scale industries with more accuracy and authentication of results. Complete automation of medium scale industries resolves the most of environmental issue at the same time improve quality of product and productivity of the organisation hence by looking at the above analysis we can easily say that industry 4.O or automation impact on medium scale industries in Indian economy. Further

research can be carried with respect to large size of samples to generalise the automation impact on productivity of the organisation.

References:

● Acerbi, F., & Taisch, M. (2020). A literature review on circular economy adoption in the manufacturing sector. Journal of Cleaner Production, 273, 123086. https://doi.org/10.1016/j.jclepro.2020.123086

● Azadegan, A., Mellat Parast, M., Lucianetti, L., Nishant, R., & Blackhurst, J. (2020). Supply chain disruptions and business continuity: An empirical assessment. Decision Sciences. https://doi.org/10.1111/deci.12395

● The Industry 40 revolution and the future of Manufacturing Execution Systems (MES).Journal of Innovation Management. https://doi.org/10.24840/2183-0606_003.004_0003

● Bai C, Dallasega P, Orzes G, Sarkis J (2020) Industry 4.0 technologies assessment: a sustainability perspective. Int J Prod Econ 229:107776

● Becker M, Mahr D, Odekerken-Schröder G (2022) Customer comfort during service robot interactions. Serv Bus. https://doi.org/10.1007/s11628-022-00499-4

● Belanche D, Casaló LV, Flavián C, Pérez-Rueda A (2021) The role of customers in the gig economy: how perceptions of working conditions and service quality infuence the use and recommendation of food delivery services. Serv Bus 15:45–75

● Damoah IS, Ayakwah A, Tingbani I (2021) Artifcial intelligence (AI)-enhancedmedical drones in the healthcare supply chain (HSC) for sustainability development: a case study. J Clean Prod 328:129598

● Moeuf A, Lamouri S, Pellerin R et al (2020) Identifcation of critical success factors,risks and opportunities of Industry 4.0 in SMEs. Int J Prod Res 58:1384–1400