IMPACT OF USING AI IN MANUFACTURING INDUSTRIES

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ABSTRACT

The indispensable concerns we discovered concerning the key points, impacts and reasons for AI deployment in manufacturing industries are presented in this study. Through our questionnaire, we solicited 100 responses from leading manufacturing plants across 4 countries to assess the type of situations emerging owing to the implementation of AI in the manufacturing plants. The test findings revealed some intriguing trends in AI reliability. It has been proven that the evolution of AI is directly tied to the quality of employee decision-making for the improvement of industry performance. Aspects linked with errors in making instantaneous decisions may potentially impair the production line, in addition to issues about quality decision-making. Apart from that, there is a level of consistency associated with risks of using humans in decision-making in day-to-day management, which can raise serious issues for the company's long-term viability. The three hypotheses have been tested and provided conclusive evidence about the positive effects of the usage of AI in the manufacturing sector. A simple random sample drawn was tested on the SPSS platform and the findings collaborated with other scholarly research indicating the positive impact of AI in small manufacturing and improving productivity at the plant level.

Keywords: Digitization, Decision Making, Management, Productivity, Production Process, Technology.

INTRODUCTION

From the 16th century, the world has seen a renaissance in the field of industry with the Industrial revolution in the sectors of manufacturing. From the past times they were showing tendency towards the technology-based and machinery-based operations, where the constraints of human can be nullified. With this knowledge they were able to expand their productivity. Not only from these days but also from the time of ancient Chinese and Egyptian engineers made automations. Even Greeks had a concept of robotics which they have implemented in the humanoid robots. The roots of modern artificial intelligence might be seen as an effort to characterize the ancient philosophers' system of human mind (for making decisions) as a system that is purely symbolic. But after 1956, when the major theme "*Artificial Intelligence*" was developed at a conference conducted in Hanover, the field of artificial intelligence was adequately defined. The scientists had a very positive outlook on the development of AI. But Alan Turing, known as the "*Father of Computing*" set the bar by developing the universal counting machine, a device that could use its own method to solve any issue (Mijwil, 2015). As computers pursue objectives independent of their creators and exceed us in fields traditionally thought to be the sole realm of humans, it may eventually change how we perceive our place in the cosmos. It makes no difference whether we admire them as a new form of life or scorn them as just intelligent devices, whether we think of them as aware or unconscious. They probably will get more intimate and important in many facets of our lives (Kaplan, 2016). Now if we focus on the progression of last 10 years it raised itself as a platform where we can avoid the human constraints such as errors, less productivity due to excessive workload and also less importance towards deadlines in the manufacturing industries, which lead them to focus them Artificially Operated Manufacturing

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Units, which leads to decrease the number of employees engaged for the whole process. Because, by installing one machine the process maybe costly and depends on the testing but at last it secures the top most priority in the point of efficiency, time management, maintaining deadlines and human errors. Now companies are feeling free towards shifting AI based manufacturing units to attain the best productivity from their side (Jay et al., 2018).

Previously those companies who were decided to shift only their assembly line from automation, but whenever they faced the same issue regarding the scheduled quality check of those devices they tried something different with the industries which are liable for the fabrication of those devices. They came across such a game changing innovation which was a doorway of Next Generation AI .They installed a software in those devices which help you to get the reports directly about their own health. So, if the machinery faces any issues they introduced such technologies which will directly send you reports regarding that after sensing the issue. Even some companies introduced such technologies which will directly contact the nearby service center by sending a report of the issue, which was so revolutionary that the maintenance for those devices the companies used to recruitment many skilled personals, but now they don't need to do that. They can totally focus on the automated devices and the related services for an efficient production line. This was the starting of an revolutionary era (Buchmeister et al., 2019).

This was all about manufacturing processes but now they introduced subjects like Machine Learning, Data Science which are directly related to automation and Artificial Intelligence. Machine Learning is totally based on data sorting and management equipped with algorithms which enables to swift analysis of tendencies of market and the demand analysis of the different products .Previously companies used to recruit experts for Business and Market Analysis which is now a totally AI based platform, where you will get all of your data related to analysis and demand from your website or your merchant's website. So, for these also companies started to recruit less experts, which was beneficial for those companies. They can take the report whenever they want directly from the website with just a mouse click (Massimo et al, 2021; Yang et al., 2021).

Now, people were facing issues to become handy with the efficiency of those automated systems simple because human beings can work only for a limited time without break. But for such machines equipped with automation they can work 24*7. So people faced coordination issues with them, specifically for emergency services. If a device suddenly malfunctions creating fatal effects throughout the assembly line then we may face communication issues. So, they implemented remote technologies such as Internet of Things (IoT) which will directly inform the emergency support team. This caused a massive change in the manufacturing sector by assuring manufacturing, maintenance, safety these three (the major concerns of any company) is totally secured .So, now for these type of decisions companies now-a-days totally focused to recruit less number of Core Engineers, causing a great quantization of Core Job Markets. For the adverse effect of these from last few decades students are showing less interest towards the core branches, which causes a large mob in the computronics branches.

The use of AI in the period of the pandemic COVID-19 has been improved in light of the pandemic's rapid global distribution to several nations. A lockdown imposed by government was in effect on about one-third of the world. Eventually, the pandemic destroyed the workplace's culture. There were preconceived notions about how labour and business interactions should be. As they adjust to working during a pandemic and get ready for recovery, organizational leaders decided which cultural changes they want to maintain and which ones they must fight. As a result of the need for innovative approaches to deal with an uncertain environment brought on by the "*New normal*" many workers across a range of industries are worried about losing their jobs. To fulfil contemporary employment requirements, employers expect employees to take on more responsibility for developing

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and acquiring new skills (Krishnan, 2020).

Pandemics also led to a redefining of the organization's approach to learning and development. As a result of pandemic-related disruptions, several businesses have established training programs that take into account the abilities their personnel currently possesses versus those that may be needed in the future. Workers' emotional reactions and organizational aid to various groups of employees during a crisis differ due to the social exchange relationship between them. After the pandemic has gone, maintaining the empathy that was established will need careful monitoring of employee privacy. Corporate empathy "*programs*" that aim to artificially preserve this age of good feeling may not be popular with employees who disclosed more personal information about their lives during the pandemic. More delicate methods were necessary, based on online communities developed during the pandemic and operated by certain staff members. The pandemic's contribution to cultural transformation is how it worked as a catalyst.

Literature Survey

Based on an analysis of the characteristics and operation of the process industry as well as the global development of the intelligent manufacturing industry, a new model of intelligent manufacturing is proposed for the process industry, namely, deep integration of industrial artificial intelligence and the Industrial Internet with the process industry (Tao, 2021).

The significance of AI, the requirement for a precise road plan, and the requirement for thoughtful investment in this area. There is an urgent need for methodical AI development and application in order to observe its true impact in the next generation of industrial systems, namely Industry 4.0. AI is emerging from science fiction to become the frontier of world-changing technology (Lee et al., 2018). Artificial Intelligence (AI) is a technology that enables industries to explore many not only intelligence but also ways to model our decision-making. Industrial AI is used to enable engineers to fabricate and apply AI algorithms with greater efficiency in terms of success. Employee performance is the combination of how your employees act at work and how well they carry out the tasks you've assigned them. In order to provide clients with high value, reduce waste, and run your business efficiently, your firm often sets performance goals for both individual employees and the organization as a whole (Krishnan & Praveen, 2021) Artificial intelligence (AI) is a typically multi diverse domain which is concerned not only with the theory and practice fully concentrated on the fabrication of systems but also exhibits the comparison between Human Intelligence and a device equipped with AI (Tecuci , 2011) . Artificial intelligence (AI) is the main point to catalyze the change and to make us aware of the future of AI. Devices equipped with AI i.e. Robots will be the future model of an errorless, efficient industry experience. Intelligent augmentation is the main key point for the fabrication of AI (Haritha & Krishnan, 2022; Lee et al., 2019).

Potential of industry is drastically changed by the usage of AI. It has started its journey as a model of more efficient, more flexible, and more reliable industry. Due to the revolution of industrial digitization, it already has secured a place in the industry from its premature state. The Generated Data is continuously processed and analyzed. The amount of data received every time from the industries are always presented digitally (Siemens, 2022).

The area of learning and development in the organization was also redefined due to pandemics. Some firms have taken advantage of pandemic-related interruptions to take a step back and assess what skills their staff currently possess versus what may be required in the future, and developed training programs accordingly. Due to the social exchange relationship, workers' emotional responses and organizational assistance to diverse groups of employees vary during a crisis. Maintaining the empathy developed after the pandemic has passed will necessitate careful management of employee

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privacy (Mukherjee & Krishnan, 2022).

An AI powered manufacturing environment is equipped with automated optical inspection (AOI) units to identify which product meets the company standards and if not then simply they will reject that one, but these have an accuracy rate of 60-70%;not enough for an industry maintaining a high quality production criteria.

Objective

1. In this regard, AI is a new technology tending to change the trends in terms of manufacturing processes and decision making in the industry in terms of AI assisted industry and industry 5.0 solutions
2. By streamlining and streamlining the processes, this can alter the industry. Any industry could benefit from this and it could alter the industry's trend. The purpose of manufacturing objectives and goals is to increase a company's profitability
3. The objectives of the manufacturing industry are related to quality, safety, vendor selection, efficiency, and costs. This paper may contribute to the analysis and contribution of new ways towards efficient industry solutions

Application of AI in Manufacturing Industries

According to a Birla Soft article titled "*Remarkable Use of AI in Manufacturing Industries*," plant managers can now keep an eye on their facilities in real-time thanks to Fourth Industrial Revolution (4IR) technologies like machine learning, automation, advanced and predictive analytics, and IoT (Internet of Things). This assists in gathering enormous volumes of operational data for better production line analysis and rate measurement, self-paced production line troubleshooting, and fewer missed deadlines than in the past. By the end of 2025, McKinsey predicts that the value of 4IR technologies will increase to $3.7 trillion, and that AI alone can add $1.2-$2 trillion to the value of manufacturing and supply chain management. Because of this, the Global Lighthouse Network currently has 54 stations, and ten more will be added in 2020. This growth immediately reflects the increasing adoption of core 4IR technologies and their integration into routine supply-chain and manufacturing processes, as organizations place a greater emphasis on keeping up with the competition while others may have lagged behind and are still in pilot purgatory (Betti et al., 2020).

A new approach to manufacturing called smart or intelligent manufacturing integrates system engineering, intelligent science and technology, large manufacturing technology, including design, production, management, testing, and integration, and related product technologies, into the lifecycle of developing cutting-edge and effective products (Li et al., 2017).

To be more specific we can say that AI technology facilitates along with the development of new manufacturing models assisted with modern technologies in the domain of intelligent manufacturing.

Now apart from manufacturing the decision making in manufacturing industries are also related with them; the recent advancements in AI are based on the application of different machine learning techniques. Deep-learning AI, being equipped with the ability to learn without being explicitly programmed, is becoming more capable to handle an industry environment. These are the ideal systems for classification tasks, but the person using AI algorithms is in the dark about the process of decision making (Bertolini et al., 2021). A general AI powered with deep learning, trained with the recent data of the company can easily make decisions about the wellbeing of company business and it's future concerns. The AI may use research algorithms which have already been introduced and apply them to new situations to get a better and improved insight and constantly adjust and recalculate, aiming for the optimal efficiency of manufacturing, develop algorithms to optimize the shipping cost of consumer products for a single device manufacturer, identifying the most efficient way to deliver each item from the factory to the store or the consumer's doorstep. It would gradually

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expand capabilities and skills of the employees for an improved decision making setup of that industry.

Robots are frequently required to modify their pre-planned configurations in human-robot, or AI, collaborative assembly in order to work alongside human operators in a shared workspace. Today's robots, however, are operated by a variety of different protocols, making it impossible for humans and robots to collaborate effectively. Multi-modal yet symbiotic communication and control systems have been a focus in answer to this necessity. These techniques include the perception of brainwaves, interactivity, gesture recognition, and voice processing. Classification, recognition, and context-awareness identification require deep learning (Wang et al., 2019; iResearchNet, 2022).

Another perspective holds that sensitive robots are employed in industry and, in some instances, work side by side with people on shared workspaces to complete collaborative activities. This kind of human-machine connection appears to have significant risks. However, extra hardware, cutting-edge algorithms, and risk-reduction measures can guarantee that such collaborative situations are secure for people. The key components include workspace construction, collaborative operation methods, end nodes, and human-machine interfaces (Kaiser et al., 2018).

This implies that accepting the technological developments is critical for an organization to keep awake to date and maintain an upper hand. At present, HRP is done for the most part by a workforce that examines every one of the sources to track the competitors (Bhardwaj et al., 2020).

METHODOLOGY

Using quantitative methods, the review of survey, poll, and questionnaire data using statistical, mathematical, or numerical methods, as well as the modification of statistical data that has already been acquired using computer tools, are all examples of stress dimension. In this study, which uses a quantitative method with a deductive approach, a large pattern measurement was used to perform large pattern checks in a manner similar to qualitative research, but with the use of a small pattern dimension The empirical evaluation of an assertion from a large pattern using statistical equipment to a process-based find out about of the statistics gathered from the sample is known as quantitative research. Finally, the examined end result is used to confirm the assumptions and hypotheses of the research team. To carry out the right and more correct scientific investigation, a beautiful research approach is really important. We take a deductive technique here, in which a hypothesis is framed first, and then data are gathered from the sample. To confirm the aforementioned, a statistical analysis is carried out (Mukherjee & Krishnan, 2022).

Processes Involved

To entice each participant to take part in the study, a questionnaire with well-structured questions was prepared and distributed to them individually. In this study, a deliberate and useful sampling strategy was applied. The sample of responses consisted of about 50 active professionals in HR decision-making positions in multinational and domestic businesses. The survey, which was distributed by the researcher, received a total of 80 responses. 50 (62.5%) replies have so far been received from a wide range of sectors, including IT, technical, financial, HR, education, and many more. The data from these responses has been used for statistical analysis. Processes used in fieldwork include: A pilot survey and a final survey made up both halves of the complete process. The technique for evaluating the usefulness of the questionnaire was the Likert scale (Raducan, 2014).

HYPOTHESIS & QUESTIONNAIRE

H_1: *Artificial intelligence is significantly assisting day-to-day leadership decision-making in the*

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production process.

H_2: *AI is improving business and performance with swift decision making*

H_3: *AI is improving efficiency and reducing the cost of manufacturing processes*

Analysis and Results

Reliability Statistics

Table 1
CRONBACH'S ALPHA TEST

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.912	0.911	17

Interpretation

Table 1 reliability statistics help to analyze the internal consistency of the variable. The value from the calculation is 0.912 shows substantial and strong evidence of causality where the number of items was 17 in consideration.

Table 2A
INTERTERM CORRELATION

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
Q1	1	0.42	0.259	0.295	0.288	0.238	0.522	0.437	0.562
Q2	0.42	1	0.437	0.495	0.364	0.394	0.369	0.39	0.38
Q3	0.259	0.437	1	0.608	0.41	0.397	0.414	0.336	0.341
Q4	0.295	0.495	0.608	1	0.54	0.605	0.445	0.57	0.529
Q5	0.288	0.364	0.41	0.54	1	0.595	0.546	0.402	0.378
Q6	0.238	0.394	0.397	0.605	0.595	1	0.582	0.55	0.453
Q7	0.522	0.369	0.414	0.445	0.546	0.582	1	0.551	0.565
Q8	0.437	0.39	0.336	0.57	0.402	0.55	0.551	1	0.541
Q9	0.562	0.38	0.341	0.529	0.378	0.453	0.565	0.541	1
Q10	-0.07	0.093	-0.069	-0.04	-0.092	-0.126	-0.051	-0.039	-0.29
Q11	0.52	0.448	0.388	0.558	0.465	0.45	0.645	0.378	0.57
Q12	0.348	0.411	0.593	0.591	0.387	0.425	0.548	0.624	0.548
Q13	0.297	0.238	0.24	0.286	0.158	0.25	0.314	0.392	0.333
Q14	0.279	0.249	0.331	0.44	0.367	0.303	0.397	0.264	0.157
Q15	0.199	0.348	0.342	0.441	0.383	0.514	0.395	0.475	0.392
Q16	0.345	0.586	0.472	0.674	0.593	0.561	0.535	0.685	0.545
Q17	0.231	0.403	0.342	0.394	0.366	0.515	0.546	0.69	0.427

Table 2B
INTERTERM CORRELATION

	Q10	Q12	Q13	Q14	Q15	Q16	17
Q1	-0.07	0.348	0.297	0.279	0.199	0.345	0.231
Q2	0.093	0.411	0.238	0.249	0.348	0.586	0.403
Q3	-0.069	0.593	0.24	0.331	0.342	0.472	0.342
Q4	-0.04	0.591	0.286	0.44	0.441	0.674	0.394
Q5	-0.092	0.387	0.158	0.367	0.383	0.593	0.366
Q6	-0.126	0.425	0.25	0.303	0.514	0.561	0.515

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Q7	-0.051	0.548	0.314	0.397	0.395	0.535	0.546
Q8	-0.039	0.624	0.392	0.264	0.475	0.685	0.69
Q9	-0.29	0.548	0.333	0.157	0.392	0.545	0.427
Q10	1	0.116	0.117	0.009	-0.203	0.122	0.149
Q11	-0.305	0.436	0.329	0.368	0.285	0.469	0.28
Q12	0.116	1	0.578	0.38	0.45	0.733	0.515
Q13	0.117	0.578	1	0.376	0.342	0.43	0.231
Q14	0.009	0.38	0.376	1	0.35	0.432	0.193
Q15	-0.203	0.45	0.342	0.35	1	0.523	0.541
Q16	0.122	0.733	0.43	0.432	0.523	1	0.669
Q17	0.149	0.515	0.231	0.193	0.541	0.669	1

Interpretation

The inter-term correlation was calculated for 17 questions, and Q10 yielded negative findings, indicating little association between the items (Refer Tables 2A & 2B). A number between 0.1 and 0.50 indicates good outcomes. A correlation of more than 0.50 indicates a strong relationship. The overall results were larger than 0.50, suggesting a substantial correlation between variables.

Regression Analysis

Table 3
MODEL SUMMARY

	R	R Square	Adjusted R Square	Std. Error of the Estimate
Hypotheis-1	.429[a]	0.184	0.15	0.844
Hypotheis-2	.644[a]	0.415	0.391	0.958
Hypotheis-3	.583[a]	0.34	0.312	0.945

Interpretation

Refer Table 3 model summary to find out the error of the estimate. Value R square is 0.184 in the case of H_1, 0.415 for H_2, 0.340 for H_3. This reflects the overall measures of the strength of association. It does not reflect the particular variable associated with the dependent variable. The analysis helped to analyze the predictor of the variable. Adjusted R square helps to helps to analysis the accuracy between one variable and another.

Table 4
ANOVA

	Model		Sum of Squares	df	Mean Square	F	Sig.
Hypotheis-1	1	Regression	7.704	2	3.852	5.404	.008[b]
		Residual	34.218	48	.713		
		Total	41.922	50			
	Model		Sum of Squares	df	Mean Square	F	Sig.
Hypotheis-2	1	Regression	31.287	2	15.644	17.048	.003[b]
		Residual	44.046	48	.918		
		Total	75.333	50			
	Model		Sum of Squares	df	Mean Square	F	Sig.
Hypotheis-3	1	Regression	22.090	2	11.045	12.361	.001[b]
		Residual	42.890	48	.894		
		Total	64.980	50			

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Interpretation

Refer Table 4 to predict the relationship between the variable. The total variance was calculated, and responses were taken as 50. The total variance taken was explained with the help of independent variance. Analysis was performed to determine AI's impact on the decision-making and production process. P value arrived from all the 3-hypothesis tests are less than 0.05. This clearly shows the value arrived are statistically significant. The residual value for three hypothesis was 48, and Regression (3.852,15.644,11.045), residual (0.713,0.918,0.894). Thus, the analysis proves a significant difference between the variables. (I.e.). Artificial Intelligence is positively impacting the production process and decision-making in manufacturing industries.

Analysis and Discussion

From the collected data from the first 50 respondents, it's clear that people from various sectors have participated in the survey which is hereinafter described by the table. We see that the majority of people are from manufacturing, finance, and government and private sectors, all of which will be affected by AI in the near future or are already involved in the transition, indicating that we have a wide range of reactions.

Development of AI in Decision Making

As per the responses of our survey, we received responses that have shown that irrespective of the respondents they agreed with the presence or importance of AI in their company or institution.

Limitations

1. The analysis and survey is based on the responses from four countries and nine manufacturing plants.
2. The random samples were drawn from known sources which may affect the study passively.

Future Prospect

This study can be done by covering more no of plants globally by considering variety of samples in the random sampling with a large response data.

Leadership, or the capacity to persuade others to act a given way, is a complex of aspects pertaining to the belief that people are travelling in the same direction, the objective of the investigated system, the collective decision, and the motivation of human resources. Some people's communication and convictions-based orientation. Leadership takes on a more sophisticated form in management, which is bound and determined by the leader's personality, the organizational culture, and the external business environment.

The words power, authority, and impact may come to mind when you think of leadership. You might consider the initiatives taken by capable leaders to achieve significant objectives. You can picture a real person who has won praise for their leadership qualities. Leadership is the ability to identify what needs to be done and then to get others to desire to do it, according to Dwight D. Eisenhower, the 34th president of the United States. The ability to shape other people's attitudes, behaviors, and thoughts is referred to as leadership. It is the method through which people are inspired

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to support the success of the organizations they are a part of. Leaders provide their followers with direction and aid in helping them concentrate their efforts on accomplishing their objectives. Though none of the ideas fully explains everything about leadership, each one has gained some scientific backing. Theorists have generated a wide range of hypotheses regarding leadership. Some of the theories are predicated on the notion that some people are "*born leaders*" possessing certain characteristics that support their capacity for leadership. According to other beliefs, effective leadership requires a certain set of abilities and attitudes. According to certain beliefs, a leader's efficacy is dependent on the circumstance in which they must act as a leader. Other ideas focus on how a leader interacts with his or her followers in order to better understand leadership. In this study, we look at these distinct hypotheses.

A newly released report by the Sage Group estimates that over 24% of organizations worldwide are now adopting AI for hiring. Over the next year, 56% of HR managers expect to use AI technologies. Second, roughly 75 million current employment will go, according to forecasts made by the World Economic Forum (WEF). Due to the creation of an additional 133 million new employment rolls and positions, particularly as a result of Artificial Intelligence (AI) and Machine Learning (ML), there will be tremendous pressure on the HR department, which will lead to the hiring of more HR specialists by the organization.

CONCLUSION

After conducting statistical analysis and debating the influence of AI on the manufacturing industries, it is obvious that AI will be at the forefront of the future era of decision-making, with great prospects for decision-making and efficient manufacturing. We need collaboration with IT behemoths for their technology, as well as support for the industry's development and progress in terms of decision-making, to make it more prosperous. This study also considers employee and corporate satisfaction with management's decision-making abilities, as well as the rise of AI as an alternative concept. Nevertheless, the sanity of the atmosphere and the method to structuring AI decision-making, notably preserving a proper relationship between employees and management while evaluating the prospects and consequences of the decisions taken, are major determinants. So, based on responses collected from the questionnaire and the qualitative analysis was performed based on the survey results gathered from various personalities engaged in different industries and services, this article presents a very promising output and approach towards the implementation of AI for decision making in manufacturing industries.

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