



"IMPACT OF INFORMATION TECHNOLOGY TOOLS AND TECHNIQUES APPLICATIONS IN MANUFACTURING INDUSTRIES: SPECIAL REFERENCE TO AUTOMOBILE INDUSTRIES"

Dr.Kaveri Lad

Assistant Professor Department of Management Science Dr.Babasaheb Ambedkar Marathwada University Aurangabad [Maharashtra]

ABSTRACT In the today's era each and every field like production, marketing HR, Finance, and operation work with the concept of information technology in the world. The paper highlights how Information Tools perform the work effectively in manufacturing industries specially automobiles industries. After analyzing the literature it has been concluded that I.T. tools has become essential part of automobile Industries. I.T. tools and techniques like Artificial Intelligence , Robotic, CNC Lathe machine, VMC, PLC, Cloud Computing , Sensors, Micro-Comptrollers, Databases, Fuzzy set and Programming Languages are used in automobile industries. This paper describes applications of I.T. Tools and techniques, Benefits, impact of IT tools on employment , limitations and recommendations.

KEYWORDS : DAI in automobile, CNC/PLC/VMC lathe, Robotics, Cloud Computing, Programming Languages, Databases , Sensors and SCADA.

The Research Paper consists following topics

1. Introduction
2. Review of Literature
3. Research Methodology
4. Data Analysis and Interpretation
5. conclusion and suggestions

INTRODUCTION

The Information Technology Tools and Techniques such as Artificial Intelligence and Programming Languages are the term of computer science but it derived by all basic sciences. Therefore by many authors have defined the term AI as an Integration of Physics, Mechanical, Electronic, Mathematics, Statistics, production, medical sciences and basic engineering as there is not a single field where Artificial Intelligence concept is not used.

Artificial Intelligence

"The properties include the ability to plan, solve problem, and in general, reason. A simpler definition could be that intelligence is the ability to make right decision given a set of input and a variety of possible action."¹

"The Artificial Intelligence is defined, is concerned with intelligent behavior in artifacts. Intelligent behavior, in turn, involves perception, reasoning, learning , communicating and acting in complex environment. Another goal of AI is to understand this kind of behavior whether it occurs in machines or in humans or other animals. Thus AI have both engineering and science goals."²

"Artificial Intelligence is the study of how to make computers do things which at the movement, people do better, this definition is of course, somewhat ephemeral because of its reference to the current state of computer science and it fails to include some areas of potentially very large impact namely problems cannot now be solved well by either computers or people."³

"Intelligence can be simply defined as a set of properties of the mind. These properties include the ability to plan, solve problems and in general reason. A simpler definition could be that intelligence is the ability to make the right decision given a set of inputs and variety of possible actions. Intelligence can make the right decision and we can apply this not to humans, but also to animals that exhibit rational behavior."⁴

AI is that part of computer science concerned with designing intelligent computer system that exhibit the characteristics used to associate with intelligence in human behavior."⁵

"AI is a branch of computer science and a discipline in the study of machine intelligence that is developing intelligent machine or intelligent system imitating, extending and augmenting human intelligence through artificial means and techniques to realize intelligent behavior. AI is usually defined as the science and engineering of imitating, extending and augmenting human

intelligence through artificial means and techniques to make intelligent machines."⁶

Branches of IT Tools and Techniques used Automobile Industries

- Robotics
- Expert System
- Programming Languages
- Cloud Computing
- SCADA System
- PCB Controller
- Remote Sensing

ROBOTIC

This is a technology where mechanical and computer devices are integrated together to perform very tedious task with high precision. Today all industries are using robotic technology. Actually a robot is a mechanical or virtual agent or we can say that robot is an electro-mechanical machine that guided by computer program or electronic circuitry. It is also called as autonomous or semi-autonomous humanoids. This technology of AI deals with automated machines that can take the place of humans in dangerous atmosphere or manufacturing process. The main purpose of this technology is designing, constructing, operating, controlling, and sensing the specific task.

Robot is also becoming a useful technology in all manufacturing industries. Robot is useful in many tasks such as helping the handicapped person, clean dirty space, performing repetitive tasks, hazard tasks, heavy tasks such as shifting of four wheeler from one production line to another production line etc. The definition of Robot is defined by one author :

"In popular culture, the term "robot" generally connotes some anthropomorphic(Human-like) appearance; consider "arms" for welding. The tendency to think about robots as having a human-like appearance may stem from the origins of the term "robot."⁷

"A Robot is a reprogrammable, multifunctional manipulator, designed to move material, parts, tools or specialized devices through variable programmed motions for the performance of a variety of task."⁸

Robotic is a man-made mechanical device that can shift by themselves, whose movement must be modelled, designed, intellect, activated and proscribed, and whose movement performance can be prejudiced by "programming". Robots are called "intelligent" if they achieve something in stirring in protected interaction with a formless atmosphere.

The role of robotic or integrating automated robotic system in business becomes essential thing in today's world. To maintain quality, production, safety, saving the automation system is in needed. Robotics performs all above task very accurately. Specially Industrial automated robots are designed that have the capacity to noticeably increase the quality of product .

Expert System

The expert system is one branch of Artificial Intelligence which is integrated with computer system and software that incorporates the importance of the particular facts of human expert in a precise, narrows the field area and imitates the decision-making ability of the human experts.

Expert systems, as a subset of AI, first emerged in the early 1950s when the Rand-Carnegie team developed the general problem solver to deal with theorems proof, geometric problems and chess playing. About the same time, LISP.”⁹

Programming Languages

Programming Languages is a Techniques through which lot of Mechanical Devices Controlled. The Languages used in Automobile Industries are C, C++, Java and Artificial Intelligence Languages such as LISP and Prolog.

LISP(LIST Processor)

LISP is programming language which contains a set of primitive operators that enables to carry out several kinds of presumption with directory containing random strings of characters representing predicates and their argument

Cloud Computing

National Institute of Standard Technology (NIST) defines the cloud computing as follows:

“Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources(e.g. networks, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management efforts or service provider interaction. This cloud model is composed of five essential characteristics, three service models, and four deployment models.”¹⁰

SCADA Systems (Supervisory Control and Data Acquisition)

This is Remote Monitoring and Control System which helps to communicate within the Automobile Industries, This technology is also called as Industrial Control System. This system includes Industrial Processes, Infrastructure Processes and many other.

PCB Controller

PCB controller made up of printed circuit board. This technology in AI consists the group of devices such as electronic components, mechanical devices that run by electricity and controlled by computer programming. These controllers are called as Task Controlling Block or Process Control Block. The data structure concept is used in operating system mainly in KERNEL which helps to manage the process. The main role of PCB controller is process management, processes scheduling, memory /input output resource access.

Remote Sensing

Remote sensing is also called as Artificial Sensing Intelligence (ASI), it is a framework and platform which is used in Industrial applications such as automatic and robotic nano-micro-sensors as this technology has embodying perception capacities, self learning abilities, cognition and adaptation facilities and functional reaction capabilities.

“Remote sensing is a geographic analysis tool capable of producing large quantities of data in the spectral, temporal and spatial domains. Techniques for automating the image analysis process would be advanced by the inclusion of artificial intelligence techniques in the design of image processing systems. The remote sensing application which show promises for successful implementation of artificial intelligence techniques are intelligent onboard processing, advanced database interrogation, and the automated analysis of multispectral imagery.”¹¹

LITERATURE OF REVIEW

Author Ingrand and Ghallab¹² has explained how Artificial Intelligence is more powerful concept in computer science. Both authors put their valuable knowledge in deep how Robot which is one branch of Artificial Intelligence act as an Human being and how it works as a Human. Authors explained in broad way what the mechanism means how tools are fitted into artificial body and how programming in controlling to it.

TerescoJohn¹³ The author has kept his view on the advantages of robot

in production process and investment. The robot act in many sense and many way and author explain in very good manner that how industrial robot perform very strong and crucial job in production process and what are the implications of it for aggressiveness in automation investments

Milačić, V. R., Miler¹⁴, in the international journal the author published the research on Artificial Intelligence and elaborate the application of heuristics forecasting by expert or Delphi method and its applications in identifying, indexing, counting and parametrizing the collection of all likely devices to achieve a specified functional capability.

Vujosevic, R¹⁵ The purpose and advantage of simulation techniques are explained in his research articles. In simulation system Visual Interactive simulation concept is there which help to display real-time graphic display of designed model and this model built with mathematical and symbolic model. VIS model is used in SCADA system which helps to overlook and make a control on all the processes of the production line.

Cloud Computing using Windows Azure¹⁶, by Roger Jennings explained applications of cloud computing in industries. He also elaborates the types and concepts of each type and how industries can save expenditure due to cloud computing.

<https://www.youtube.com/watch?v=q6c6icuRouA>¹⁷, the program on National Geography in Mega factories it has been shown that how the pepico plant is established with full automation system. In this episode it has been shown that from making the bottle to seal the bottle how all steps of manufacturing is performed on only automation. The purpose of robotics, microcontroller, automation tool, and function of expert system everything is shown.

PROBLEM: I.T. Tools and Techniques reduces the Employment.

Objective of the Study:

The major objectives of the study are as follows:

1. To know that historical background of Information Technology tools applications in Industrial Units in Maharashtra.
2. To analyze the Artificial Intelligence efforts Vs Human efforts.
3. To take the review of operations performed by Information Technology tools in Industrial Unit in Maharashtra.
4. To make the survey of Industrial Unit with artificial Intelligence
5. To examine the effect of IT tools and Techniques on Employees productivity from Top to Bottom Level of Industries.

HYPOTHESIS :

1. There is effect on employment due Automation System in Manufacturing Industries.

RESEARCH METHODOLOGY

The following Research Methodology have been adopted to complete this research work.

Primary Data

The primary data is collected from manufacturing industries from Maharashtra State. In this study the survey is made on automobile manufacturing industries. The primary data is collected from 70 Automobile Industries of Maharashtra State.

Secondary Data

To outlook the applications of Information Technology Tools and Techniques in Production system, Quality Management, Finance Management, Marketing Management, Staff selection in selected industrial unit in Maharashtra State, the required data would be collected from secondary sources viz. reports of Individual Reports of Industrial Units, Reference book related Artificial Intelligence, Magazines published by the Industries. Documentary data from selected industries

Selection of Samples

In Maharashtra State a large number of Industrial units are producing manufacturing products like automobiles parts, electronic parts, two wheelers and four wheelers, medicine product, cosmetic products. Among these Industrial Units a large number of Industrial units use the

Information Technology techniques in their Industrial Units for producing the product, maintaining the quality assurance, maintaining financial matters and other aspects related to business'

Analysis of Data and its Interpretation

The data collected has been analyzed in three ways

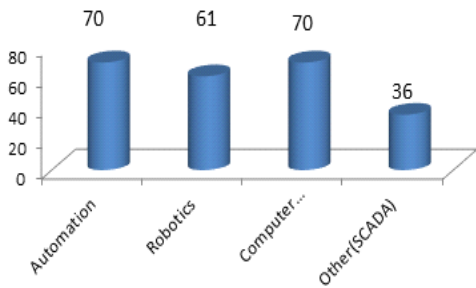
- 1) Single Factor Analysis
- 2) Proportionate Z-test

DATA ANALYSIS INTERPRETATION

I] Automation Tools used in Automobile Industries

Table No : 1

Name of IT Tools/Techniques	No. of Units Answered	%
Automation	70	100
Robotics	61	87
Computer Technologies	70	100
Other(SCADA)	36	51



2). Machine Design Tools used

Total Units :-70

Table No. 5.2.1.2

Name of IT Tools/Techniques	No. of Units Answered	%
Computer Aided Design (CAD)	53	76
Computer Aided Engineering (CAE)	27	39
Computer Aided Manufacturing (CAM)	42	60

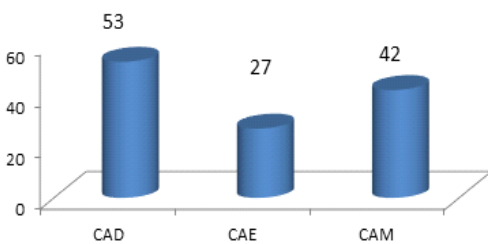


Figure No. 2

3. Reason of Applications of IT Tools

Table No. 5.2.1.3

Name of IT Tools/Techniques	No. of Units Answered	%
Improve production Quality	70	100
Decrease material cost	68	97.14
Reduce the labour cost	65	92.85
Reduce the waste of material	63	90
Better floor space utilization	18	25.71

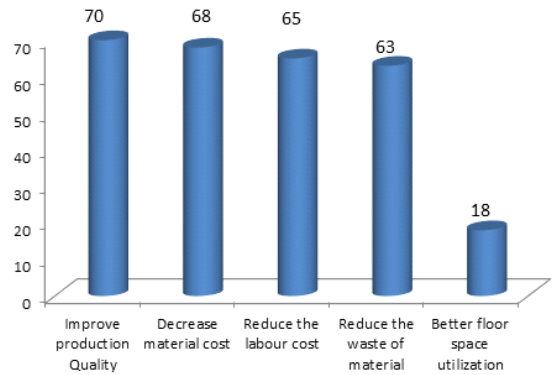


Figure No.3

HYPOTHESIS TESTING

Ho :	There is no effect on employment due Automation System in Manufacturing Industries. i.e. H0=75
H1 :	There is effect on employment due Automation System in Manufacturing Industries. i.e. H0≠75

Number of Employees Before and After Automation in Automobile Units

Total Units : 70

Table No. 5.6.1

Before Implementation of IT Tools and Techniques	After Implementation of IT Tools and Techniques
101225	49535

Source :Data Collected From 70 Automobile Industries

From collected data following calculations are performed

Total Automobile Industries	:	N=70
Mean of Difference from Observation	:	X =738.42
Square Root N	:	Sd=8.36
Standard Deviation(sd)	:	948.29

$$Z = \frac{\bar{d}}{SD/\sqrt{n}}$$

Putting values to the formula

$$Z = \frac{738.42}{948.29/8.36}$$

$$Z = 6.50$$

Degree of freedom = n-1, 70-1 i.e. 69

z- test value of 69 with 5% significance level is 1.99 which is less than calculated value. Therefore, null hypothesis is rejected and alternative hypothesis is accepted.

Hence it is concluded that there is effect on employment due Automation System in Manufacturing Industries.

CONCLUSION

1 This can be concluded that that more than 80% units are fully

automated with Robotics which helps to increase the productivity of the automobile unit

2 It is concluded that Robotics performs difficult task, repetitive task such as lifting and moving heavy object, spraying the objects and firing the object. It helps to increase productivity and provides the safety to human workers

3 It is concluded that Robotics to perform & control complex work and also installed Machine Design Tools viz. Computer Aided Design and Computer Aided Manufacturing (CAD & CAM).The Robotics are controlled by Programming Languages

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