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Effects of Artificial Intelligence in Information Technology Industry

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ABSTRACT: In light of the rapid innovation in digital technologies in the form of smart automation techniques, a deep impact has been felt in the business ecosystem, especially among Information Technology (IT) firms. A major implication of this technology is reflected on the employment in industries since there is a huge conversion of the work process through systems which are designed to perform tasks and operations performed by humans. Following this, the aim of the study is to capture the effects of automation among IT firms in U.S.A with respect to employment. The study examines 3 IT firms in city of Los Angeles, U.S.A via collecting primary data from 20 employees of the chosen firms through a close ended questionnaire. The results indicate that automation poses advantages as well as disadvantages to the industry and thus requires few initiatives in relation to build expertise in human resources for handling the related business operations.

KEYWORDS: Automation, AI, Information Technology.

I. INTRODUCTION

In the past few decades, innovation in technology has created many disruptions in the labor market. In the early 19th century, the manufacturing sector witnessed the replacement of traditional machinery and workers with fixed location industrial robots[1]. This was followed by the GPS tracking system which drives the world with a combination of advanced sensors[2]. The recent decade has captured new technology driven control system that have set a fear of job loss especially in the IT industry. This advancement is driven by combination of artificial intelligence, robotics and advanced machinery. These digital technologies emerged in the form of newly designed systems known as 'smart automation'[3].

Automation is the conversion of the work process through systems which are designed to perform tasks and operations performed by humans[4]. During the past 40 years, the early automation process was dependent on mechanical and electromechanical control devices. However, currently the smart automation are designed in the form of machine learning software that observe the operations of humans during their training process and replicate the same decisions for management that reduces the needs of human operator[5]. However the accelerating capability in artificial intelligence has a varied impact on employment over a long period of time. On one hand AI has taken over not only manual blue collar jobs including driving and delivery of stocks but has predicted a long sight future in white collar jobs to capture the jobs of IT professionals. On the other hand, AI has opened up new opportunities for individuals predicting high future job growth. These opportunities may come in the form of engagement and supervision of such technologies. Further, development in artificial intelligence will demand highly skilled software developers and engineers creating jobs for millions.

In U.S.A, the innovation in robotics and artificial intelligence has offered efficiencies especially in IT sectors driving up the productivity and profits. It has experienced growth in employment by around 7 percent between 2010 to

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2013[6]. The sector has experienced huge demand of software developers, training specialists, logistics, web developers and information security analysts.

The aim of this study is to capture the effects of automation on IT field with respect to the employment in IT firms.

II. LITERATURE REVIEW

Mechanisms and technologies for Integration of Artificial Intelligence (AI)

AI has developed new ways to simulate the intelligent human behavior in machines. Operations in business management have demand capabilities such as deduction, reasoning, problem solving, planning learning, creativity and so on[7]. In addition to this, the businesses require machines that represent the execution of business task through knowledge representation, perception and general intelligence.

Artificial intelligence is part of intelligent agent systems called computational intelligence. That includes several other techniques including neural networks, fuzzy logic, swarm intelligence and artificial immune systems. These techniques have developed mechanisms to operate cyber security applications[8]. General algorithms are another AI technique that can imitate the process of selection. It offers robust and optimal solutions for complex computing problems. These are often used to generate rules for different security attacks[2]. Further, artificial neural networks comprise of artificial neurons that develops the ability to learn and solve problems. These are used to learn process information, organize and adapt to solve problems that demand conditionality and ambiguity at the same time. Also it can deliver parallel learning and decision making at a fast speed, enabling a suitable learning pattern for classification and selection of responses to attacks[9].

Benefits of Artificial Intelligence/Automation in IT Industry

There are various benefits of AI in the IT industry. Intelligent automation in form of making prediction can help in minimizing the costs and risks and delivering efficiency in the work[3]. Different machine learning software provides support in the form of client on boarding, transaction monitoring and prevention of frauds by detecting the different pattern in the behavior[6]. In addition to this, speech recognition tools are used for customer service technology to automate the telephonic interactions and to detect the identity of the callers. Further, development of new NLP(Natural language processors) software such as Fin Genius has enabled the interpretation of client questions and could even offer software support[7].

Artificial intelligence has also offered multiple advantages to employees as most repetitive and tedious work can now be performed by autonomous systems[5]. The complex back office activities that included manual work can now be performed with high accuracy. In the business management process, the data is collected automatically through algorithms and is transferred from purchasers to sellers system. These technologies are remote control and have been integrated with camera system to keep a track of the activities of the organization. [7].

Challenges in the Integration of AI in IT Industry

Although artificial business intelligence has offered multiple benefits to integrate the business management system, there are considerable challenges faced by business leaders and employees. Also these challenges have generated uncertainties about social and employment repercussions[6].

The most crucial issue to deal with the autonomous systems is safety[10]. Earlier, it was ensured that robots used in manufacturing are characterized by safety fences. But, with the accelerated growth in artificial intelligence the automated systems are used to for working in confidential information and data. The increase the number of cybercrimes has ensured that these systems are more prone to malware attacks. These attacks can harm the business operations and management. If these autonomous systems are not ensuring safety zones, they can generate huge potential loss for the business leaders[9].

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The optimal operating procedure require system that synchronize with each other, IT experts are facing a challenge to integrate the autonomous systems according to the work of the organization to achieve optimality in value added change[11].The businesses use autonomous systems to analyze huge data volumes of about 300 gigabytes per hour which is itself a huge challenge for the machines[6]. The machines have to appropriately detect the traffic signs and instructions. The systems should be capable enough to detect the human errors as well as machine failures. Failure of the autonomous systems can lead to misleading outcomes and can generate serious problems for business management[9].

Lastly, the challenge is in terms of inequality in job distribution among the workforce. Although, the development in artificial intelligence will generate multiple jobs for web developers, IT trainers, software engineers and data scientist however, it reduces the demand of low skilled jobs that include data entry, information specialist, customer care executives and so on. This will generate inequality that will harm overall social development[12].

Companies Benefitted From Automation

Cisco is a U.S based MNC that manufactures and sells networking hardware, telecommunication equipment and high technology services. TheCisco intelligent automation for cloud has offered a cloud platform that can deliver any time of service, in a self-service manner[13]. The cloud service automates the sophisticated data center and complex business process from a single self-service portal. The Cisco orchestration and network automation solution can automate service delivery, launch new services and reduce the operation costs. The company uses real time analytics, model driven technology and multi-vendor orchestration to execute its operations[14].

Oracle is an American multinational IT company that offers integrated cloud applications and platform services. The company has created a policy automation to collect, model, deploy and analyze the updated policies. The policy automation has enabled organizations to deliver services and policy obligations to compliance with laws and regulations. Apart from policy automation, the value added distributors have leveraged a service platform to assist partner to integrate digital marketing initiatives[15].

Implications of AI for Business Functioning

The fast development in the IT sector and accelerated growth in artificial intelligence has brought in many advantages in the form of increased output, efficiency, high accuracy and lower operational cost[16]. However, this innovation is vulnerable to many security threats, machine failures and high unemployment. Therefore, it can be said that IT firms need to focus on its employees and their development perennial to technological advancements like AI. Further, the automated systems need to be reliable enough to provide accurate results to construct trustworthy and intelligent agent systems.

III. RESEARCH METHODOLOGY

The researcher gathered quantitative data using primary research approach including the survey method on chosen 3 IT firms located in Los Angeles,U.S.A. These firms were chosen as these firms have recently implemented artificial intelligence technology in their business operations.The primary data collected was used to understand the effects of automation on their business performance with respect to the effects on employment after incorporating artificial intelligence in IT firms. For this purpose, the researcher prepared a close-ended questionnaire which wasdistributed among 20 employees working in different departments of the IT firms. The researcher spent 5 days to gather information from the respondents.

IV. DATA ANALYSIS

In the present chapter, the researcher has conducted data analysis to capture the effects of automation on IT field among the IT firms in USA. For this, the researcher prepared a detailed analysis of the primary data collected from 20

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employees working in different departments of the 3 IT firms in U.S.A to understand the effects of automation on their business performance with respect to employment. The demographic profile and general background of the respondents is shown through frequency analysis. Subsequently, the next section of the chapter will examine the inferential analysis for data using correlation, ANOVA and regression analysis.

Demographic Analysis

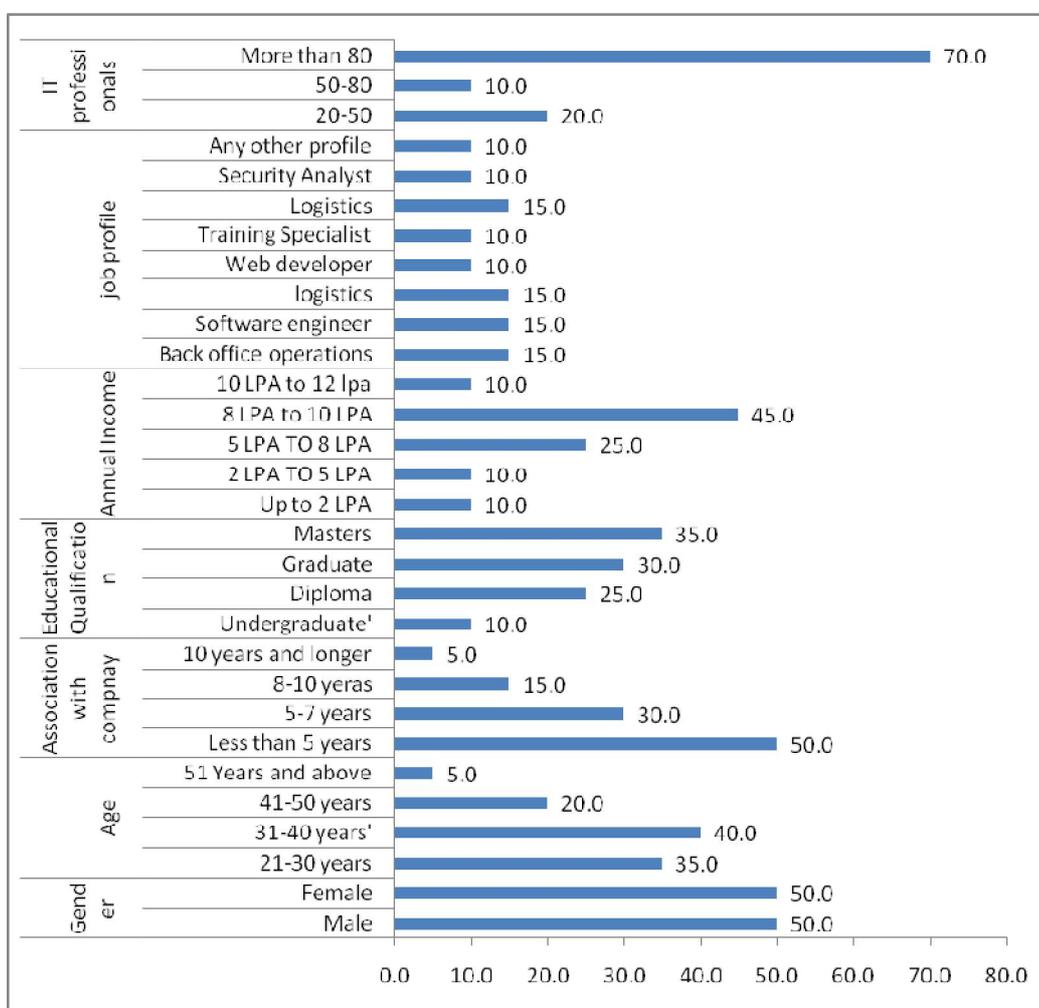


Figure 1: Demographic Analysis

From the figure above, the demographic analysis of the respondents is revealed. Half of the respondents were males and the rest were females. Majorly 40 % respondents were from the age group of 31-40 years followed with 35% from 21-30 years. In terms of educational qualification, 35 % respondents attained masters' degrees while 30% were graduates. Further in regards to annual income, majorly 45 % respondents were earning 8-10 lakh per annum. In addition to this, majorly 50 % respondents were found to have less than 5 years of association with the company. Lastly, 70% respondents supported the fact that more than 80 IT professionals work in their organization. However, majorly 15% respondents wereworking in software development and logistics department respectively.

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Overall the respondents were from middle agegroup levels and were well qualified. Also these respondents though earned quite a good income but were found to have short span of association with the company.

General Background

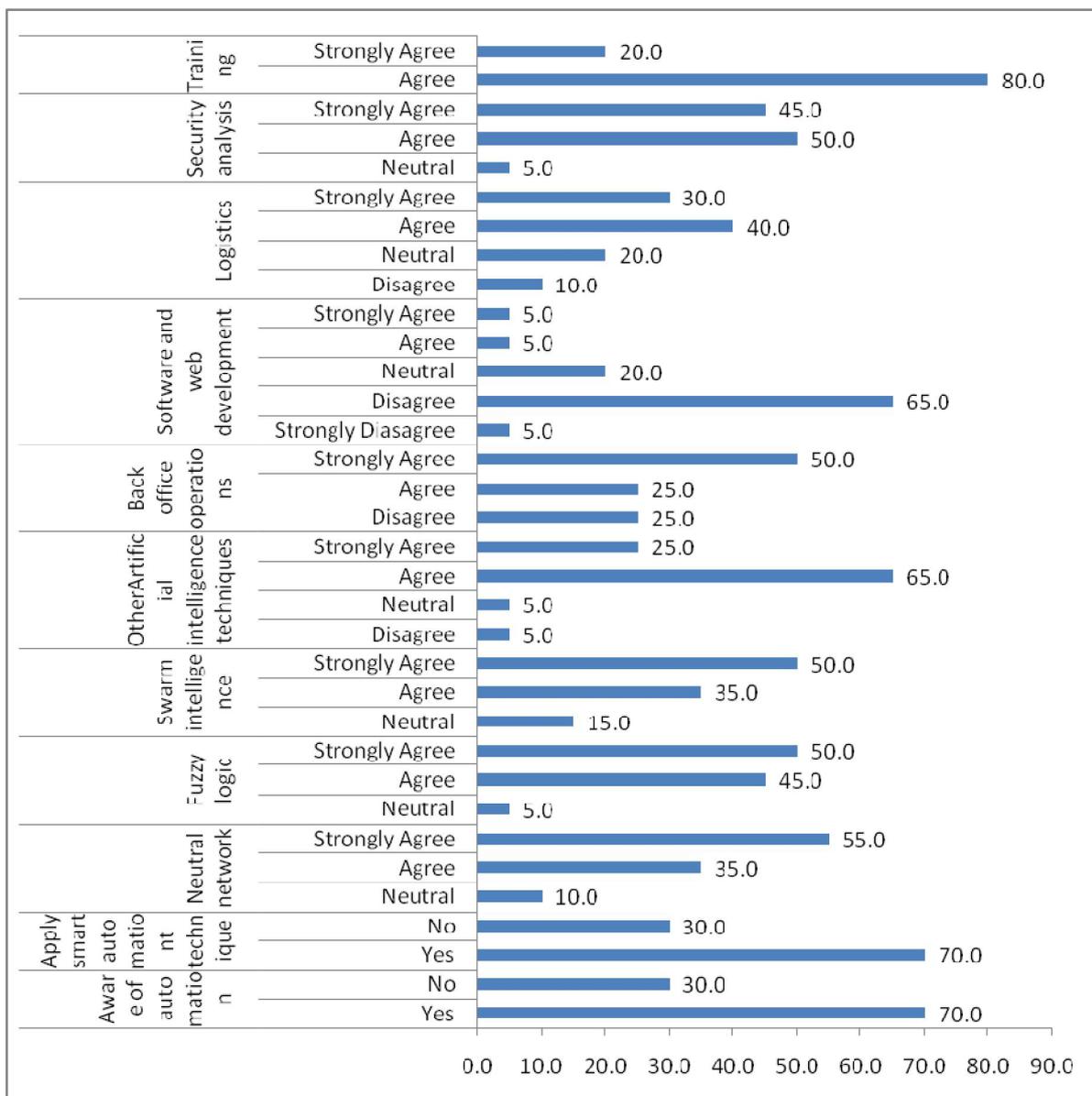


Figure 2 General Background

Figure 2 above shows the findings from questions related to the general background of the respondents. Here, the respondents were asked on information related to automation and its utility. First, the respondents were asked on

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awareness and application of ‘automation’. To this 70% respondents agreed to their awareness on the same in addition with the view that their organization applies smart automation techniques in business operations. In terms of the type of automation techniques applied, around 50 % respondents respectively strongly agreed to the use of neural network, fuzzy logic and swarm intelligence in their organization. Further, 65 % respondents agreed with the fact that their organization used other techniques of artificial intelligence like heuristics, support vendor machines, natural language processing and so on. In terms of application of autonomous techniques in business operations, majorly 80% agreed to its use in training, 50 % strongly agreed on back office operations and security analysis and 40 % agreed on logistics. However, 65% disagreed with the opinion that autonomous systems are used in software and web development. Therefore, there is varied use of different types of autonomous techniques by IT firms for their business operations.

Challenges Faced By IT Firms in Implementing Automation/AI

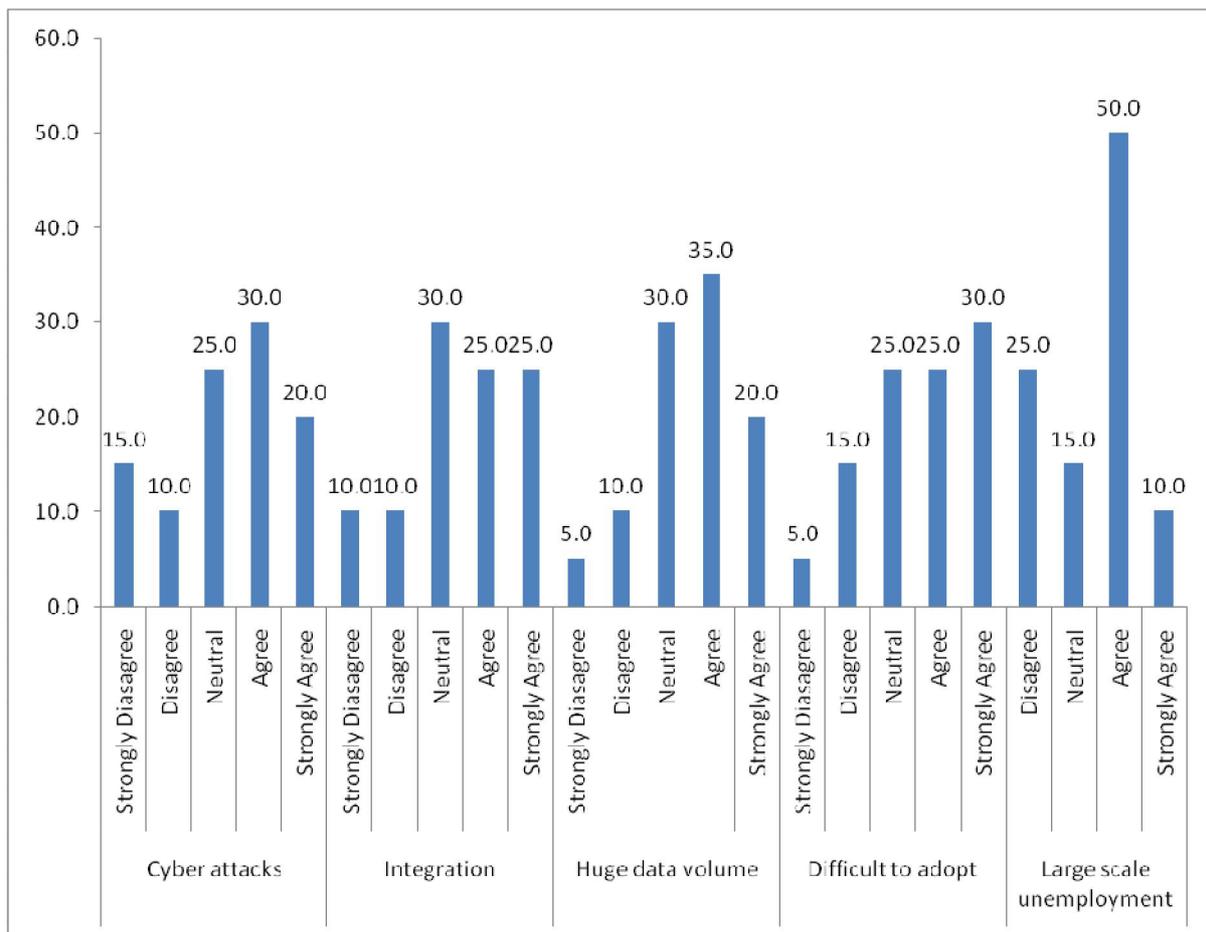


Figure 3: Challenges of Artificial Intelligence

Following this, the respondents were asked about the challenges of artificial intelligence. The findings are revealed in figure 3 above. Majorly 50 % respondents agreed that an artificial intelligence technique generates large unemployment for low skilled jobs (data entry, customer care executives etc.). In addition to this, 35 % respondents agreed that autonomous systems generate error within huge data volumes. Further, 30 % respondents strongly agreed to the view

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that it is difficult to learn and adopt new technology. Lastly, 30 % respondents agreed with the view that artificial intelligence techniques are prone to cyber-attacks; about 30 % were neutral to the opinion that integration of autonomous systems is a difficult task for IT professionals.

Inferential Analysis

To capture the effects of automation on IT field with respect to the employment in IT firms in U.S.A, the researcher undertook correlation and regression analysis. The dependent variable is ‘positive impact of automation on the performance of the organization with respect to its employment’ and the set of independent variables comprised of benefits of artificial intelligence. The proposed hypothesis is as follows.

HA: *There is no significant positive impact of automation on the performance of the organization with respect to its employment.*

Correlation Analysis

		Ability to learn	Techniques of planning	Knowledge representation	General intelligence	Computing problems	Solutions to client problems	Fast decision making
Positive impact of automation	Pearson Correlation	.923**	.904**	.932**	.927**	.490*	-.010	.821**
	Sig. (2-tailed)	.000	.000	.000	.000	.028	.968	.000
	N	20	20	20	20	20	20	20

Table 1 : Correlation

A Pearson correlation was used to assess the relationship of benefits of artificial intelligence with the performance of organization with respect to employment. The findings of the correlation test is displayed in Table 1 above. The correlation results in the above table indicates that there is quite high correlation among most of the variables being significant at $p < 0.05$. However, the most strongly related variable was ‘knowledge representation’ (.932**). This means that knowledge representation through automation techniques has a major impact on the performance of organization with respect to employment as it is used for extracting useful knowledge from given set of information and processing large volume of data to discover the required knowledge

In this regard, the study conducted by Sadik & Urban (2017) discussed how artificial intelligence techniques used in innovative machines for representing knowledge. The artificial intelligence techniques integrate the models in the learning process such as web applications offer virtual spaces where software can interact in mixed communities involving exchange of formal knowledge.

Regression Analysis

Regression analysis is undertaken including all the variables due to high and significant correlation of independent variables with that of the dependent variable.

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ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	25.068	6	4.178	79.661	.000 ^b
	Residual	.682	13	.052		
	Total	25.750	19			

Table 2 :ANOVA

The ANOVA table shown above reflects that the hypothesis i.e. there is no significant positive impact of automation on the performance of the organization with respect to employment is rejected since the F value is significant at $p < 0.05$. In addition the F- value is high (79.661) so the probability for accepting alternative hypothesis results to be quite high and hence the hypothesis is rejected.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.987 ^a	.974	.961	.22901

Table 3: Model Summary

Further R square (97.4 %) and adjusted R square (96.1 %) are quite high for the model regressed. So, this indicates that around 97 % variation is contributed by the independent variables in the dependent variable. This has been revealed in the Table 3 above.

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.075	.195		.387	.705
	Ability to learn	.255	.104	.290	2.456	.029
	Techniques of planning	-.494	.179	-.616	-2.768	.016
	Knowledge representation	.936	.249	1.121	3.751	.002

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Generalintelligence	-.069	.295	-.084	-.234	.819
Computingproblems	.103	.051	.113	2.045	.062
Fastdecisionmaking	.263	.073	.293	3.583	.003

Table 4 : Coefficients of Regression

Further the coefficient regression analysis in the table above shows that out of all the significant variables ‘*knowledge representation*’ and ‘*techniques of planning*’ contributed a major change on the impact of autonomous systems on the business performance with respect to employment since its standardized beta coefficient was highest of all being significant at $p < 0.05$. The coefficients of regression findings in the present study is reflected in Table 5 above.

Knowledge representation has a positive impact on autonomous systems (1.121) via the standardized beta coefficient, significant at $p < 0.05$. This is because knowledge representation helps the organization to present the summary of huge sets of data and information in a simplified manner. This in turn creates wide opportunities for employees to adopt such techniques and increase their performance abilities. In this context, the study conducted by [17] revealed the knowledge representation can process the information from different sources in a common semantic framework. Further, knowledge representation also support employees’ skills with different reasoning mechanisms, task description as well as object information which provides query interfaces and visualization tools.

It can also be seen that ‘*techniques of planning*’ showed a negative impact of autonomous systems on the business performance (-.616) via the standardized beta coefficient, significant at $p < 0.05$. In this regard, the study conducted by [18] states ineffective management techniques does not provide employees to cope with the situation especially to protect the confidential data and information leading to emergence of cybercrimes. This results in retrenchment as well as employees exiting the firms.

V. CONCLUSION

The development of artificial intelligence has displaced the face of shift in the employment in the IT sector. The findings of the study indicate that the implementation on automation techniques on performance of business with respect to employment is positive with ‘*knowledge representation*’ while negative with ‘*techniques of planning*’. Knowledge representation via automation is useful for employees and augments their efficiency to work as they can present the summary of useful information from huge sets of available data and information. However techniques of planning underlying automation pose a threat to employees who lack such expertise. This results in retrenchment as well as employees exiting the firms thereby impacting performance of the business organization. Overall it can be indicated that automation poses advantages as well as disadvantages to the industry and thus requires few initiatives to be taken and are mentioned below.

- a) **Alignment strategies:** IT professionals are needed to align the artificial intelligence systems according to the needs of the organization. Primarily the industry should identify the department where the techniques could be employed in order to detect how much employees and what type of employees are required.
- b) **Human centric planning:** The industry must frame strategies not only recruiting the required skilled employees but also building expertise in human resources in order to handle complex problems of frequent machine failure and other business operations.
- c) **Training strategies:** Deep learning programs in varied neural networks, fuzzy logic, swarm intelligence and artificial immune systems would build a team of intelligent machine learning agents. Complex algorithms learning can create reasoning and problem solving capabilities among the employees.

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New human to machine interactions will enable the interaction of human and machines that will also detect the emotions of humans and change their responses accordingly. In addition to this, the machines capabilities will continue to improve and might displace more human workers simultaneous to continuous demand of knowledge and aptitude within the workforce. Robotics is seen to be at the tipping point in future to perform slew of functions without considerable human effort. Also such automation techniques will bolster connectivity and reliability in a hyper-competitive ecosystem in everypossible working department.

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