

An Empirical Study to Identify Determinants of Effect of Technology on Labour Market in Emerging Indian Economy

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Abstract

The manufacturing companies have put forward their interests in investments for innovation and development in technology for opening the economy of the nation. The foreign trade as well as advent of technology have been the two important reasons for manufacturers to invest even more in the research and development associated to manufacturing industries (Lee et al., 2018). This paper throws light on the factors necessary for analyzing the impact of development in technology on the labor markets prevalent in India. The labor market in the country is dynamic in nature. We analyze the effect of innovation on business and the interest of investors in technology amidst the manufacturing sector in India. There are major queries at various platforms such as whether technology in rise is going to affect employment rate or not; whether labors will find it difficult to locate jobs for themselves and cases of inequality along with minimal wages while exploiting the labors could potentially grow if the things are not monitored carefully. These doubts need justifiable clarifications. With the objective of determining the factors related to technology and its impact on the labor market, this study has been formulated. A sample of 173 people associated with labor market was surveyed to know the factors that determine the impact of technology on labor market and its significance. It is found that Technology creation as well as destruction, labors and industries determine the impact of technology on labor market.

Key Words: Labor, Technology, Innovation, Market, Business, Manufacturing, Industries, Developing, Emerging Nation.

Introduction

The advancement of technology is a fundamental driver of total monetary development of a country. It is also important for the economic development of the nation, which continuously upgrades the expectations of people for everyday comforts over the years coming ahead. It expands the level of efficiency. In the same manner it attempts in helping per capita pay and national employment. The evolution of technology and its advancement has generally been steady and progressive over the long run (Alfani, 2019). However, on a couple of events, innovative change has been progressive, changing the authoritative design of social orders and economies. It can be said for instance that technology led productivity as well as other useful gains from innovation prompted enormous decreases in farming work, the rearrangement of economies and social orders around modern metropolitan focuses. Notwithstanding, for this to occur, advanced and innovative developments alone are not adequate, as dissemination of new advances is basic to the growth of a nation.

Technology has also intervened in the places wherein humans were not able to encroach. These are evolving in such areas where the ability of humans was known to be the most important aspect that helps in accomplishing those tasks which were done by using the machines or mechanical power. The pace at which technology and innovation are developing from

quality altering to AI and improved material may connote that another mechanical upheaval is within reach. It could be extraordinary for pretty much every industry and each country. The developing capacity of the AI technology frameworks to independently tackle any kind of complex issues could probably reshape the nation's economy and society, for instance by growing new types of transportation or altering medical services (Dwivedi et al., 2021). Not only is this, but the technique of 3D manufacturing of products pathbreaking to the timeline of manufacturing conventional items. The 3D manufacturing has led the least developed nations to prosper by giving genuine solution to industrialization problems (Flentø & Ponte, 2017). The upcoming fresh technologies have advantages but also disadvantages associated to it. This can be a threat to the existing and disruptive labor market; it calls for inequality in the income as well. The job seekers are anticipating that AI, ML, and other technologies will eat up the jobs and shall lead to massive disruption of jobs. This might possibly create major unemployment and huge impoverishment in and around the country. There is a simultaneous increase in social conflict because of the salary or wage difference between the labors as well as the owners of technology. Therefore, the workers are losing income which was earlier on their share. Technology has made the processes in manufacturing easier compared to the conventional methods which cause delay in the usual cycle of production (Attaran, 2017). With the advancement in technological innovation, the routine, repetitive and mundane work has been eradicated with the need of hiring skilled labor. This way, the demand for skilled labors has potentially risen. Manufacturing activities and jobs are ultimately becoming polarized because of such reasons (Jaimovich, & Siu, 2020).

The productivity and the growth of any nation in all aspects can only be spurred with the help of innovation and continuous development in technology. The impact of innovation and technology on the economy of a country is not so much predetermined. However, the same can be formed by use of efficient strategies at the different levels of authority such as the local governing bodies, public, and finally at the worldwide levels (Alhola et al., 2019). Instead of taking an uninvolved or sit-back approach, the public authority along with the supreme bodies such as United Nations must have their impact on these cycles of productivity. The overall condition of planning a strategy building ought to be able to embrace and direct these new technological advancements. The government bodies rather than attempting to shut these out from the dreadfulness of interruption, the business analysts and strategists ought to embrace proper adaptable administrative as well as legitimate arrangements. This would help to elevate public abilities for innovation and participating in making new technologies for dealing with modern problems in the business domain (Benton et al., 2020).

Simultaneously, these proactive approaches are expected to guarantee that the growth levels are comprehensively shared, and the unemployed laborers get support for resuming their work. If technology and innovation can probably change the idea of work and can potentially disrupt the structure of customary social protection, strategies can lessen weaknesses by growing social assurance frameworks. The level of innovation prompts less equivalent pay dissemination; arrangements are known to rearrange pay (Liu et al., 2015). If the technological advancements change the idea of abilities which the job markets demand from the labors, educational plans in schools as well as colleges can be adjusted at work and deep-rooted learning opportunities has the potential to be promoted. National approaches ought to be supplemented by local and worldwide activities to resolve issues that are transnational in nature. Advancement of Innovative development ought not to be blamed for strategy inaction, but instead as a motivation to track down cures to the problems existing in the business world.

Literature Review

The technological disruption has caused havoc in the entire world. It has made its mark in several fundamental areas of daily life. The time when industrial revolution was beginning and production was at full swing, hardly ever anyone had imagined the fate of industries in the years to come. Evolution of machines has made the jobs of humans easier and following the same path the computerized globe has impacted even more (Rao & Prasad, 2018). It has brought in comfort and luxury at the footsteps. However, in the manufacturing industries whether technology has proved to be a boon or bane is still a question for all. It has added a greater number of advantages to the list of manufacturing industries such as easing of processes, speed in communication, storing humongous data, and transfer of information. These are some of the major impacts that technology has created in all nooks and corners of the business world. Earlier humans were solely responsible

for transporting, processing orders by customers, managing the financial assets, monitoring the perusal or energy consumption and what not (Ouaddah et al., 2016). However, technology has made it possible for these time-consuming tasks to be performed in a couple of minutes or even seconds.

Innovative limits currently incorporate into numerous spaces of materials, mechanics, and advanced frameworks. There have been late leap forwards in controlling nuclear or sub-atomic designs to work on the actual properties of materials. New quality level strategies take into consideration the control of organic frameworks, including the human genome. Progress in computerized regions remembers headways for data innovation, processing, information investigation, and virtual as well as increased reality, to give some examples (Kanade & Prasad, 2021). For assembling, upgrades in mechanical interaction mechanization have profited from progress in computerized reasoning blessed advanced mechanics. While exclusively great, it is the mix of these many advances and new forward leaps that can open considerably more extraordinary innovative change.

Fabricating is likewise being changed by progresses in innovations, for example, 3D printing, that can radically modify the way actual products are created. 3D printing offers many advantages over customary types of assembling, including quicker prototyping of plans, the capacity to make complex and altered things, and the capacity to rapidly change a plan (Rayna & Striukova, 2016). 3D printing works by adding material each layer in turn dependent on a computerized set of directions. Customary assembling, conversely, fabricates things by one or the other trim or eliminating material through cutting, boring or processing. Progresses in added substance fabricating have empowered more fast and exact printing of the ideal shape utilizing, for instance, bright light to solidify the material at each progressive layer (Agilesh et al., 2020). This cycle is a lot quicker than the conventional technique for dissolving a material and saving it in progressive layers. It additionally should create more grounded and better-formed materials given the substance idea of the printing system. Added substance fabricating decreases the time span between plan and creation. It considers fast changes to the thing and for customization. It likewise doesn't need economies of scale as building a cycle around embellishment does. Rather than requiring the production of numerous indistinguishable things, 3D printing can be beneficial regardless of whether individual things are tweaked since the progressions happen in programming. For metal parts, 3D printing takes into consideration more complicated shapes that might be almost unimaginable with traditional techniques, diminishing the requirement for welding, for instance (Kang & Ma, 2017). This is appealing for tweaked or elite execution things utilized in specialty applications. Moreover, things can be requested on a case-by-case basis and delivered in the best accessible area, hindering the requirement for enormous inventories.

The government ministries or departments are even more focused on the matters consisting of unions and labors. The public authority is concerned with the labors in the unions, especially in the Center, ministers are discussing on plans as well as strategies for estimating work the way the market works, the actual working conditions besides the changes with respect to labor cost and its fluctuation in the industry going along the nation's economy (Saravanan et al., 2018). The main objective of the authorities is to bring forth all the important data as well as statistics and dissect the information out of it by analyzing the financial numbers for making strategies valuable to the private as well as public organizations while dealing with the workers. Private and public choices identified with work markets. Further, working conditions are progressively being affected by innovative contemplations. Prodded by a rush of mechanical improvements identified with digitization, man-made reasoning, mechanization, legislatures all over the planet have proclaimed that the creation and arrangement of these innovations present both significant freedoms as well as difficulties to their residents (Yang et al., 2016). Having better information identified with the work market and computerization innovations could go quite far in aiding address the worries raised by innovation. With these issues behind the scenes, the BLS dispatched this report to recognize builds that would supplement existing BLS items with an objective of guaranteeing that the essential information exist that would permit partners to evaluate the effect of robotization on work results.

The idea of innovation is at the core of macroeconomic examination. In standard macroeconomic development models, work and capital are the vital variables of creation that produce monetary worth. Essential macroeconomic bookkeeping takes away the worth of these quantifiable variables from Gross Domestic Product and portrays the remaining as usefulness

development. In these neoclassical models, this remaining usefulness development is the main long period driver of higher expectations for everyday comforts. It is normally alluded to as innovation. In the most straightforward adaptations of this system, innovation makes work more useful and results in higher normal wages as well as buying power. As this survey will talk about, researchers have extended and convoluted this structure as of late, yet a binding together topic is that innovation is firmly connected to usefulness development.

Total usefulness development has generally prompted wage development, yet there are hypothetical motivations behind why this may not hold later. One chance is that an inexorably huge portion of GDP or efficiency gains could go to capital rather than work, remunerating financial backers yet not specialists (Schwartz, 2014). Besides, regardless of whether some portion of efficiency gains goes to laborers, the advantages could be unevenly appropriated by level of ability or sort of undertakings performed. This audit will talk about how financial analysts have attempted to evaluate the credibility of these and related situations.

Since innovation is so firmly identified with usefulness, the survey begins with how financial specialists have deciphered efficiency development patterns and how they identify with mechanical change. In the eighteenth and nineteenth century advances related with the Industrial Revolution significantly diminished the expenses of creating food, clothing, and different merchandise—through recording gadgets, radio, film, TV, planes, and vehicles, the expenses of correspondence and transportation. Gordon in the year 2017, observed that the most monetarily significant advancements happened from 1870 to 1970, a period related with exceptionally quick development (Wroński, 2019).

In any case, different financial specialists and researchers have arrived at what could be portrayed as the contrary end—contending that new advances have as of now began to significantly change the work market and will probably speed up in their belongings. Klaus Schwab (2016), originator and chief executive of the World Economic Forum, has ventured to mark the current time of mechanical progression the Fourth Industrial Revolution, underlining the fast speed of progress (Kasza, 2019). Steady with Schwab's (2016) conceptualization, Gill Pratt (2015), who earlier dealt with a mechanical technology program for Defense Advanced Research Projects Agency, contrasted the most recent rush of advances with the Industrial Revolution, and stated: This time might be unique. At the point when robot capacities advance quickly, robots might uproot a lot more noteworthy extent of the labor force in a lot more limited time than past rushes of innovation.

Expanded robotic techniques will bring down the worth of human work in numerous areas. Pratt recorded a few key advances he accepts are driving mechanical changes such as, development in processing execution, advancements in PC supported assembling devices, energy stockpiling and productivity, remote correspondences, web access, and information storage in data centers (Malik et al., 2021). Brynjolfsson and McAfee (2014) have progressed comparative contentions and guaranteed that data innovation restrained work creation later the Great Recession. It is prompting pay disparity and decreased work interest for laborers without specialized aptitude. Reacting to contentions from the individuals who consider an easing back speed of advancement to be the clarification for diminishing efficiency development, they state: We believe this is on the grounds that the speed has accelerated such a lot of that it's abandoned individuals. Numerous specialists, to put it plainly, are losing the race against the machine (Makridakis, 2017).

Protectors of this high-sway perspective on innovation are left with how to accommodate it with the noticed log jam in efficiency development. Few authors recognized the absence of solid development in macroeconomic efficiency information yet contended that this is an estimation challenge related with universally useful innovations like AI, which they showed; require huge reciprocal speculations that are delayed uncovering themselves as usefulness progresses (Brady, 2019). The contention draws on David (1990), who recorded various motivations behind why PC and data handling innovation might require a long lead time prior to appearing in estimated efficiency insights—including dissemination slacks, estimation blunder, the sluggish deterioration of past advancements, and the intricacy of authoritative rebuilding.

A connected point is found in Bessen (2015), who, recorded as a hard copy about machines of the Industrial Revolution, showed that new creations are delayed conveying on the grounds that they require huge down to earth refinements and

interests in human resources to be cutthroat with existing practices. Nonetheless, new investigation of authentic information recommends that new innovations, like programming and modern robots, essentially affected work markets. Webb (2019) finds, utilizing the text of both work task depictions and licenses to develop a proportion of the openness of assignments to computerization. Those occupations that were exceptionally presented to past robotization advancements saw enormous decreases in business and wages over the significant periods. However, regarding PCs and other data innovation, the main advances were ostensibly made many years prior as Gordon (2017) has contended, and the advances have effectively been generally embraced without significantly influencing efficiency patterns. Definite endeavors by Byrne, Fernald, and Reinsdorf (2016) to inspect the estimation challenges identified with innovation observed that even forceful suspicions about missing information or inadequately estimated gains yield just little changes in efficiency development measurements (Li et al., 2021).

In various surveys and studies based on labors and their issues mainly in the industrialized economies, an enormous arrangement of controls has been utilized to catch the impact of innovative change on the interest for gifted specialists. These examinations regularly apply information on R&D ventures, licenses, licenses, loads of innovative capital, and the utilization of data as well as correspondence advancements, among others, which ought to permit to control for the degree of innovation and advancement in a maybe immediate way (Teece, 2018). To test whether specialized change is expertise one-sided, these examinations generally center around the impact of advancement on work shares or wages differing according to different skilled groups or on changes in the expertise area of the work entrusted with. For a given inventory of laborers in every expertise class, an expansion popular for talented work should bring down joblessness of gifted specialists or potentially raise their relative wages, in this way expanding their compensation charge share. The greater part of these surveys is that the impact of technological products and the cycle of advancement on work in the developing nations center around India and is restricted to firm-even out information (Jha& Bose, 2016). The image that rises out of a study of these investigations is that the development of technology, as for industrialized economies, is associated with an increment in business, while the impact of cycle advancement isn't obvious. In this way, likewise the general impact of advancement on business is by all accounts uncertain in non-industrial nations. In the empirical studies based on technological advancement and the interest in the potential for developing technology, the impacts of exchange transparency, FDI, and innovative redesigning have frequently been explored, particularly in a non-industrial nation setting (Giuliani& Macchi, 2014).

This is frequently based on the contention that new innovations are essentially evolved in industrialized nations and that in non-industrial nations advancement frequently appears as mechanical change that is epitomized in capital gear, which is imported from industrialized nations, or that innovative overflows happen more effectively in firms with unfamiliar possession through innovation moves. As becomes obvious from the above bits of knowledge, mechanical change, and advancement have significant ramifications for rebuilding cycles of work advertises inside what's more across nations (Porter& Heppelmann, 2015). Autor (2015) perceives the significant job of strategy for responding to distributional changes among others brought about by such turns of events. Additionally, the level of adaptability of work markets and the sort of internal establishments has significant ramifications in deciding how far the innovative products and services in technology boosts the business results. These variables likewise decide the way in which developments impact work market results. The level of inflexibility of wages and occupations, which results from the kind of work market strategies in power also crafted by organizations (Platt et al., 2016), decides if mechanical change especially on the technological front impacts even more intensely on wage differentials and subsequently pay imbalance, or overall business figures.

Objectives of Study

1. To know the factors that determines the impact of technology on labor market.
2. To know the significance of technology in labor market.

Materials and Methods

A sample of 173 people associated with labor market was surveyed with the help of a structured questionnaire to know the factors that determine the impact of technology on labor market and its significance. The nature of the study is empirical

and the primary data was collected through random sampling. Factor analysis was applied to analyze the data and reach to end results.

Results and Discussion

Table 1 is demonstrating the general details of the respondents in which 56.1 percent are males and 43.9 percent are females. Among them 34.1 percent are from the age group 32-38 years, 36.4 percent belongs to age group 38-42 years and rest 29.5 percent are above 42 years of age group. 41.0 percent of the respondents are employers from the labor market and 59.0 percent are labors or employees from the labor market.

Table 1: Respondent's General Details

Variable	Respondent	Percentage
Gender		
Males	97	56.1
Females	76	43.9
Total	173	100
Age		
32-38 yrs	59	34.1
38-42 yrs	63	36.4
Above 42 yrs	51	29.5
Total	173	100
Occupation		
Employers	71	41.0
Labors or employees	102	59.0
Total	173	100

Exploratory Factor Analysis

Table 2 shows KMO and Bartlett tests in which the KMO value is 0.869, which is fit for further factor analysis

Table 2: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy			.869
Bartlett's Sphericity	Test of	Approx. Chi-Square	2178.472

	Df	136
	Sig.	.000

Table 3 is showing the total variance of the factors in which 4 factors explain total 71% of the variance. The 1st factor is explaining 22.005% of the variance followed by the 2nd factor explaining 19.767% of variance, 3rd factor explaining 15.575% of variance, and the last 4th factor has explained 14.274% of variance.

Table 3

Component	Initial Eigen Values			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.216	42.445	42.445	3.741	22.005	22.005
2	2.242	13.191	55.636	3.360	19.767	41.772
3	1.680	9.882	65.518	2.648	15.575	57.347
4	1.038	6.104	71.622	2.427	14.274	71.622
5	.828	4.868	76.490			
6	.763	4.487	80.977			
7	.620	3.646	84.623			
8	.597	3.510	88.133			
9	.414	2.436	90.569			
10	.366	2.154	92.723			
11	.290	1.707	94.430			
12	.252	1.482	95.912			
13	.238	1.398	97.310			
14	.196	1.153	98.463			
15	.127	.749	99.212			
16	.074	.437	99.649			

17	.060	.351	100.000			
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Figure 1 is the graphical presentation of the Eigen values obtained from Table 3. Hence, the total variance has been explained. This figure shows an elbow at 4 components. It portrays that total 4 factors have been extracted.

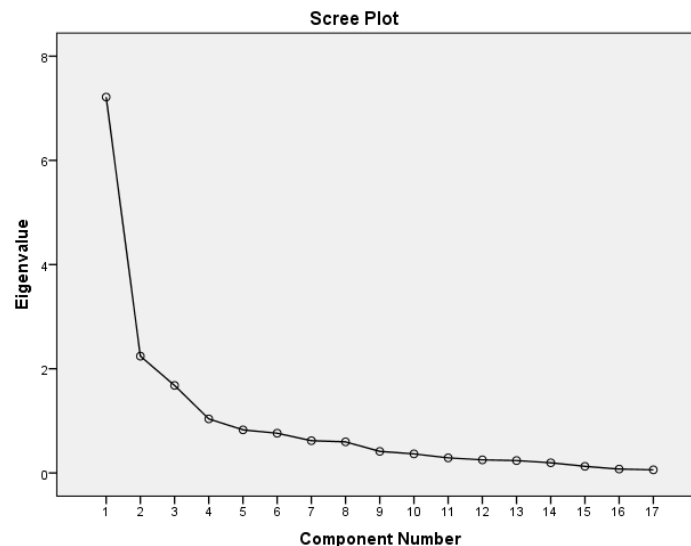


Figure 1: Scree Plot

Development of Factors

‘Technology and Creation ’is first factor that includes the variables such as Technology and automation balances specific job tasks; Technology is helping to create new industries; Technology is creating number of jobs; Increase in industry in turn increases the demand of labors; Technology is creating platform for labors and employers to meet at one place. Second factor namely ‘Technology and Destruction; ’is linked with the variables like Job seekers are anticipating that AI, ML, and other technologies are leading to massive disruption of jobs; The workers are losing income due to technology implementation in industries; Technology is increasing social conflict for salary or wage difference between the labors as well as the owners of technology; Technology is creating major unemployment and huge impoverishment. Factor three is ‘Technology and Labors ’that includes the variables like Unemployed laborers get support for resuming their work; Innovation in technology is an improvement in labor efficiency; With the advancement in technological innovation, the routine and repetitive work has been eliminated with the need of hiring skilled labor. Fourth factor namely ‘Technology and Industries ’includes the variables like technology is increasing the productivity; technology is decreasing the costs and prices; technology is increasing the demand of labors in industries; technology has made the processes in manufacturing easier and technology makes industry to deliver a similar result with less work (Table 4).

Construct wise Reliability

The values of reliability for 4 constructs were found 0.892, 0.934, 0.932, and 0.737 from construct 1 to 4 respectively.

Table 4: Rotated Component Matrix

Sl. No.	Impact of Technology on Labor Market	Factor Loading	Factor Reliability
	Technology and Creation		.892
1.	Technology and automation balances specific job tasks	.872	
2.	Technology is helping to create new industries	.854	
3.	Technology is creating number of jobs	.793	
4.	Increase in industry in turn increases the demand of labors	.749	
5.	Technology is creating platform for labors and employers to meet at one place	.667	
	Technology and Destruction		.934
1.	Job seekers are anticipating that AI, ML, and other technologies are leading to massive disruption of jobs	.818	
2.	The workers are losing income due to technology implementation in industries	.813	
3.	Technology is increasing social conflict for salary or wage difference between the labors as well as the owners of technology	.750	
4.	Technology is creating major unemployment and huge impoverishment	.743	
	Technology and Labors		.932
1.	Unemployed laborers get support for resuming their work	.831	
2.	Innovation in technology is an improvement in labor efficiency	.809	
3.	With the advancement in technological innovation, the routine and repetitive work has been eliminated with the need of hiring skilled labor	.786	
	Technology and Industries		.737
1.	Technology is increasing the productivity	.757	
2.	Technology is decreasing the costs and prices	.734	
3.	Technology is increasing the demand of labors in industries	.665	
4.	Technology has made the processes in manufacturing easier	.655	
5.	Technology makes industry to deliver a similar result with less work	.616	

It is found from Table 5 that there is total 17 numbers of items that includes all the variables for the factors related to impact of technology on labor market and total reliability found is 0.895.

Table 5: Reliability Statistics

Cronbachs Alpha	No. of Items
.895	17

Conclusion

The study has brought out the factors responsible for impact of technology on the manufacturing industries especially on the labor market. The innovation in technology and its evolution are frequently contended to be significant wellspring of the level of financial development that has been perceived by global associations and the public administrative bodies in many economically developing nations such as India. A significant number of the

Automated systems have an emphasis on development as an eminent source of financial development which has been targeting the industrial sector in the years to come. In the

Current scenario however, the immediate effect of innovation in technology is an improvement in labor efficiency, which makes it conceivable to deliver a similar result with less work what's more along these lines may antagonistically affect the quantity of occupations as well.

The change in the conventional process until arriving at conceivably advantageous results over the long period is described by a system of innovative obliteration, in which from one point of view, the positions might become old, yet then again new work is created at the same time. The development in automated machines, through speeding up the workflow, is prone to diminish the life expectancy of occupations. This is what is being anticipated by the labor class men and women. Many advancement techniques that bring their focus on development as a product of the economy of a nation have their roots in the productivity levels and the efficiency with which workers are contributing to the manufacturing industries. The technological overhauling in few papers has been encapsulated as an innovative change through the import of capital merchandise. As a result of a similar explanation, it is improbable that the investments made on research and development that produces automated machines will grow in non-industrial nations because of innovative updating in the business world.

Besides, in many emerging nations' contrasts in establishments, like a lower level of competition among different companies and the more vulnerable impact of worker's guilds and laborers unions, may upgrade interest limitations that limit these overall technological impacts.

The importation of capital goods from the developed and industrialized nations additionally has significant ramifications for business results of laborers of various expertise levels.

Hypothetically the variable inclination of innovation that has grown mostly relies upon the transaction of two impacts—the value impact, which supplements the very scarce component. It means less competition in lower developed countries, and ultimately the market size impact. The market size impact is probably going to offset the value impact, leading to the advancement of expertise in technology or innovations in industrialized nations. This unbalanced development brings about expanded interest or demand in the manufacturing industries for multi-skilled laborers, and accordingly to a lessening in business rates or potentially an increment of wages for talented specialist's comparative with less talented ones (Beerepoot & Lambregts, 2015). Rather than industrialized nations, creating economies are regularly described through a plenitude of low-skilled and less-specialized laborers and enormous paces of joblessness and underemployment. The trained or skilled workers shall have an added advantage in the era of technology.

The study concludes that 'Technology and Creation', 'Technology and Destruction', 'Technology and Labors' and 'Technology and Industries' are the factors that determine the impact of technology on labor market. It is also found that there is a significant impact of technology on labor market as technology is helping to create new industries; Increase in industry in turn increases the demand of labors. The workers are losing income due to technology implementation in industries. Unemployed laborers get support for resuming their work. Innovation in technology is an improvement in labor

efficiency. Technology has made the processes in manufacturing easier and Technology is increasing the demand of labors in industries.

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