

Job Loss due to Automation Technologies: Perceptions of Fairness in the Information Technology Sector of India

Gaurav Shetty*

ABSTRACT

The present study, addresses a research question on the perception of fairness of job losses due to automation technologies amongst general stakeholders. Jennifer Kim (2018) has shown that job displacement due to automation is perceived to be fairer in the United States when compared to outsourcing. The study by Jennifer Kim (2018) is replicated in this study on a sample drawn from the population of the Indian labour force, limiting it to the millennials and the IT industry. The results indicated that all job displacement is perceived to be unfair, despite the motive behind it. This is contrary to the results obtained from the sample from the United States. Also, there was no statistically significant difference between the perception of fairness towards the job displacement due to automation and outsourcing. Though there was no direct effect of the motive behind the job displacement/lay-off on the perception of fairness, it was found that there were significant indirect effects from the identified 4 mediators.

Keywords: Automation, Outsourcing, Fairness of Lay-offs, Lay-offs, Fairness

JEL Categories: M12, O15, D23

* Department of Professional Studies, Christ (Deemed to be University), Bengaluru, Karnataka, India. Email: gauravshetty85@gmail.com; gaurav.shetty@arts.christuniversity.in; ORCID ID: <https://orcid.org/0000-0002-0859-2210>; Scopus Author ID: 57218792204

INTRODUCTION

Automation is not a new concept for human beings. From the ancient Mayans automating water transportation through aqueducts to Henry Ford's automation of the mechanical assembly line (Eschner, 2016), automation has spanned human history since time immemorial. It has intrigued scholars and laymen alike, considering the disruption it causes in human life.

While much has been said about automation technologies and the disruption they might cause in the labour market in terms of job loss and job displacement, perceptions of automation by different stakeholders in business have been a grey area in terms of literature (Muro, Maxim, & Whiton, 2019). Organizations are designing strategies for improving productivity using automation technologies, but the after-effects of automation on the labour force have not been an area of focus, in academia and industry alike. To understand the after-effects of implementing automation technologies in business, it is important to understand the perception of automation amongst the stakeholders (MGI, 2017).

The present study adds to the existing literature by focusing on the perception of the general public towards job loss due to automation. The perception of fairness among the general public about job loss due to automation and outsourcing is being compared, considering that both of them have similar disruptions in the labour market. A similar study has been conducted by Jennifer Kim (2018). The same methodology is being followed in this study as well. However, the considered study was limited to the perception of the public in the United States. The study was conducted by recruiting participants from Amazon's Mechanical Turk (Mturk). This limited the scope of the study to participants from one occupational group and one company. Also, in the study under consideration, automation and outsourcing were specified in the context of manufacturing.

Jenifer Kim (2018) showed that the legitimacy of the motive behind automation - improving productivity, influences this fairness perception. However, these results might vary by geography and industry, due to cultural and other factors. It is important to understand these perceptions by geography and industry to design an organization-specific strategy.

The scope of this study is limited to India. The scope is further limited to Indian millennials and to the information technology industry of India.

Perception of fairness depends largely on the loss and gains of the spectators (Konow, 2005). Also, perceptions are dependent on the culture of the geography under investigation (Konow, 2001). In terms of cultural background, different countries are expected to react differently to the fairness of lay-offs due to automation and outsourcing. It was found that samples from the population taken from the United States might perceive the lay-offs due to automation more fairly when compared to outsourcing, while the samples from the population taken from France, might perceive all lay-offs negatively, despite it being due to outsourcing or automation (Nègre, Verdier, Cho & Patten, 2017). Thus, it is necessary to examine the perception of fairness towards job loss due to automation among the Indian population separately.

LITERATURE REVIEW

Automation and Employment

The fear of technological advancements taking away jobs from the population has not been a recent finding in the literature. It was as early as 1933, when John Meynard Keynes predicted that there would be widespread unemployment due to technology “due to our discovery of means of economising the use of labour, outrunning the pace at which we can find new uses for labour” (Keynes, 1933, p. 3). Since 1933, in coherence with the prediction, technology has taken over a number of jobs like cashiers, telephone operators, etc. (MGI, 2011).

High unemployment rates in several labour markets across the world have brought this debate back to the forefront. While there is no consensus or concrete evidence that high unemployment is due to the advancement of automation technologies, a number of papers have pointed in this direction (Brynjolfsson & McAfee, 2011). Brynjolfsson and McAfee argue that the pace of technological growth is increasing across the world, making a section of the labour force redundant.

Charles, Hurst and Notowidigdo (2013) studied the causes of the low rates of employment and concluded that the computerization or automation of routine jobs is the cause of the same. Jaimovich and Siu (2012) studied the decline in manufacturing employment due to automation. It was discovered that 44 percent of companies that conducted lay-offs following the 2008 recession did so due to automation (MGI, 2011).

There is also a shift in the labour market, with the labour force moving from middle income jobs to low-income service occupations (Autor & Dorn, 2013). Goos and Manning (2007) argue that this is because the service occupations cannot be computerised due to their human touch requirements (“flexibility and physical adaptability”). Also, the increased demand for problem-solving skills explains the growing demand for computing and technology jobs. Goos and Manning (2007) indicate the trend of “labour market polarization” - a growth of employment in high-income technology jobs and low-income manual jobs in service industries. This is accompanied by the decline of employment in “middle-income” routine jobs, which are being automated due to their susceptibility to computerization.

Brynjolfsson and McAfee (2011) pointed out that the pace of advancement of automation technologies is increasing at a high rate, making more and more sections of the labour market redundant and exposed to lay-off due to automation. They provide new evidence on trends in automation in the labour market which diverges from the computerization model provided by Autor, Levy and Murnane (2003). Autonomous cars, robots that can beat human experts in board games, and technology capabilities like these prove that automation is no longer limited to routine tasks. Cognitive Artificial Intelligence is racing fast towards mimicking the human brain.

Automation and Outsourcing

In this study, people’s perceptions of fairness towards lay-offs caused by automation and outsourcing is being compared. The lay-offs due to automation and outsourcing are conceptually similar in nature; both of them involve the transfer of jobs from people to other entities. In automation, the transfer of jobs is from an employee to a computer or a machine, and in outsourcing, there is a transfer of jobs from a company to another third-party vendor outside the company.

There are two possibilities for how people perceive the unemployment caused by automation: they might consider it fair or unfair.

Multiple literature from labour economics and developmental economics suggests that technologies have caused a disruption in the way of human life and people’s perception of life, money, etc. (Tyson & Spence, 2017). This literature and evidence indicate that people perceive

the lay-offs due to automation technologies unfair. Also, literature on the perception of outsourcing suggests that people perceive it as unfair to outsource jobs due to cost reduction or profit maximisation (Global Sourcing Association, 2015).

However, literature also suggests that the reactions to similar situations might be different based on the way they are framed (Kahneman, Knetsch & Thaler, 1986b). Though automation and outsourcing might have the same objective of profit maximisation and cost reduction from an organization's perspective, affected people might perceive them differently. It can be concluded that though people's general perception of lay-offs due to automation and outsourcing is generally negative when presented separately, people might consider one kind of lay-off to be fairer than the other when presented together.

Reaction of Stakeholders to Automation and Outsourcing

According to the literature, the primary reasons for lay-offs are cost reduction and increased efficiency (Budros, 1999). There are three major groups of stakeholders who are impacted by the lay-offs: victims, survivors, and investors. The perception of these three groups of stakeholders is different (Kim, 2018).

Gap in the Literature

Considering the mutually conflicting views or perceptions of fairness or justice, Adam Smith (1759) developed the idea of "impartial spectators whose unbiased views should constitute the basis of legitimate justice claims" (Kim, 2018).

Lay-offs are a decision where different direct stakeholders, like the victims, survivors, and shareholders, would have different gains or losses. This would naturally follow that their perception of fairness would vary on the lay-off decision, thus biasing the study. This study does not intend to measure the reactions of the direct stakeholders to the lay-offs induced by automation and outsourcing, as their opinions vary based on their group. The objective of this study is to measure the perception of fairness towards lay-off decisions by the general public, who are "impartial spectators" of these decisions and indirect stakeholders of an organization.

In addition, the reaction of the general public towards automation and outsourcing is being examined in this study, considering the level of disruption that these have caused in the past and will cause in the future in terms of employment and life in general. Though there are discussions around the creation of new jobs due to technological advancement, there is no authoritative estimate yet on the number of jobs that might be created (Acemoglu & Restrepo, 2017). There might be new jobs, but disruption is on its way. Thus, there is a need for the study to understand the public's perception of automation and the lay-offs induced by it. For comparison, the lay-offs due to outsourcing is being used.

Scope and Justifications for the Study

In this study, the scope is limited to a sample from India, and random sampling technique has been utilised to collect a sample from the population. In addition, the study is being restricted to millennials. The questionnaire is designed with reference to the information technology industry of India. The rationale behind these limitations is explained below.

India is a country with the world's highest youth population. With the IT revolution in the early 2000s, India utilised its demographic dividend and became the hub for IT outsourcing at the beginning of the 21st century. The IT industry in India is largely dependent on the outsourcing of IT services from other countries. It would not be wrong to term India as the largest beneficiary of IT outsourcing. Thus, it is necessary to test the perception of fairness in the job loss due to outsourcing among the Indian population.

With the development of automation technologies, computerization might become a reality in multiple sectors, including BFSI, IT Services, IT Hardware etc., and not just in the manufacturing sector (Knight, 2017). Considering that outsourcing to India has majorly happened in the information technology and biotechnology sectors, the study is being conducted in the context of the information technology sector.

Millennials relate to automation more than previous generations. Major disruptions in the labour market due to automation are yet to come, and millennials will be the most impacted generation as they will constitute the majority of the labour market. Thus, they might be more critical in judging the fairness of lay-offs.

RESEARCH METHODS

Hypothesis

Kim (2018), based on a sample from the United States, has established that “people perceive automation-induced lay-offs to be fairer than outsourcing-induced lay-offs”.

However, considering that India has benefited immensely from outsourcing and has a socialistic characteristic/fabric in the labour market as well as in society, it has been hypothesised that the sample drawn from the Indian population will perceive all lay-offs as unfair, despite the means and intent of the lay-off.

Methodology

107 participants were chosen through random sampling for the study. The target for the sample size was 100 participants per cell. A sample size of 100 would have an 80% chance of detecting the effects of $d = 0.4$ (Cohen's 'd'). This is an expected effect size in personality psychology (Richard, Bond Jr & Stokes-Zoota, 2003).

A survey was administered online to 107 participants. The sample consisted of 53% males and 46% females. Considering that the study has been limited to millennials, four participants who were over 30 years of age were excluded from the sample. In the final sample, the mean age of participants was 23.8 years, and the standard deviation was 2.51, indicating that most of the participants were millennials. Out of the final 103 participants, 81.3% were full-time employees, 46.7% were working part time or were freelancers, 1.8% were self-employed, and around 1% were students. The majority of the participants (88.7%) had 1-5 years of experience.

Each respondent in the survey read hypothetical scenarios related to lay-offs due to automation and lay-offs due to outsourcing in the context of the IT industry. Their perceptions were judged based on their level of agreement. The scenarios were also used to identify the motivators behind the perceptions. These five scenarios were directly adopted from the study designed by Jennifer Kim (2018) and were customised for the Indian context.

The five hypothetical scenarios are given below:

Automation Scenario: “An IT company wants to increase its productivity. It decides to lay off 100 employees because it will be automating some of its operations”.

Merger Scenario: “An IT company decides to lay off 100 employees because it recently merged with another company and there are departments with overlapping functions”.

Outsourcing Scenario: “A company decides to lay off 100 employees because it will be outsourcing some of its operations to reduce its costs”.

Increasing Productivity Scenario: “An IT company is firing a worker in order to hire another person who works at a faster rate than that worker. In this way, the company will be able to give more output for the same cost”.

Decreasing Cost Scenario: “A company is firing a worker in order to hire another person who works at a cheaper rate than that worker. In this way, the company will be able to produce the same output for less cost”.

Python and Microsoft Excel was used for data analysis. Statistical tests like student's t-test, single factor ANOVA, measures like Cohen's d, Cranbach's Alpha, techniques like regression, bootstrap resampling are being used. Mediation analysis was employed to measure direct and indirect effect of the mediating factors.

FAIRNESS OF PERCEPTION BETWEEN AUTOMATION, OUTSOURCING, AND MERGER

In this section, the survey responses will be analysed to understand the fairness perception of respondents towards lay-offs caused by automation and outsourcing.

Two hypothetical scenarios were considered to analyse the fairness perception between outsourcing and automation.

Automation Scenario: “An IT company wants to increase its productivity. It decides to lay off 100 employees because it will be automating some of its operations. “Outsourcing Scenario: “An IT company decides to lay off 100 employees because it will be outsourcing some of its operations to reduce its costs”.

The purpose of the study was to measure the perceptions of fairness among the respondents. Perceptions were measured using the below responses for each of the two scenarios.

“I find this decision acceptable.”

“It is fair for the company to do this.”

“It is ethical for the company to do this.”

Each of the above conveys the perception of fairness. The responses to each of the above were measured using a 5-point Likert scale starting from “strongly disagree” indicating 1, till “strongly agree” indicating 5. The higher the score, the greater the fairness perception. The responses had a high Cronbach’s alpha ($\alpha_{\text{outsourcing}} = 0.86$ and $\alpha_{\text{automation}} = 0.81$) indicating good reliability among the responses (Tavakol & Dennick, 2011).

Coding was done on the Likert scale responses for each of the hypothetical scenarios. A student’s t-test was performed on the data set, assuming unequal variances in the population. While there is still debate on choosing between parametric and non-parametric tests to analyse ordinal data, parametric tests were chosen for their higher statistical power to detect false positives and other anomalies. It has been shown in multiple studies that parametric tests can be performed on ordinal data sets as well (De Winter & Dodou, 2010; Norman, 2010; Sullivan & Artino, 2013). Also, in parametric tests, Student’s t-test was chosen as the population variance is unknown.

Based on the results, it was inferred that there is no significant difference in the fairness perception between lay-offs due to automation and outsourcing. However, there is a statistically insignificant difference between the perception of fairness and Respondents perceive the lay-offs due to automation (mean = 2.79, S.D. = 0.94) to be fairer than the lay-offs due to outsourcing (mean = 2.76, S.D. = 0.98), $t(103) = 1.97$, $p = 0.77 > 0.05$. However, the difference is miniscule and statistically insignificant compared to the results obtained by Jenifer Kim (2018) in a similar study on a sample from the United States. This is consistent with the hypothesis that participants from an Indian population would see lay-offs as unfair, despite the reasons that caused the lay-offs.

Cohen’s d test was performed to determine the effect size. An effect size gives a quantitative measure of the impact that a study group has on another. From the obtained d value of 0.04, it can be inferred that the effect is very small or statistically insignificant (Cohen, 1988).

Further, lay-offs due to merger conditions are being added, as it appears to be a valid reason for lay-offs. In this case of a merger, lay-offs are due to organisational rearrangement and not due to any objective of improving organisational health. Perceptions of the respondents to this case are important to analyse, to determine the rationality of the population.

A third hypothetical scenario was presented for the case of the merger, which is given below.

“An IT company decides to lay off 100 employees because it recently merged with another company and there are departments with overlapping functions.”

The perception was measured using three fairness questions like in the previous study ($\alpha_{\text{merger}} = 0.92$). The responses to each of the above were measured using a 5-point Likert scale starting from “strongly disagree” indicating 1, till “strongly agree” indicating 5. The higher the score, the greater the fairness perception.

Since there were three groups to be compared, a student’s t-test was not chosen as type-I error is additive in nature, and with multiple student’s t-tests, there might be a chance of a higher type-I error. An ANOVA was performed to check the fairness perceptions across three conditions.

In all 3 scenarios, automation ($M = 2.79$, $SD = 0.93$), merger ($M = 2.73$, $SD = 1.10$), and outsourcing ($M = 2.76$, $SD = 0.97$), it was perceived that the lay-offs were unfair despite the conditions of the lay-offs, $F(2, 292) = 0.11$, $p = 0.88$. Since the p-value is greater than the confidence level of 0.05, the null hypothesis is failed to be rejected and it can be concluded that there is no statistically significant difference between the means of the three groups. This is consistent with the previous results when automation and outsourcing scenarios were compared.

This directly implies that lay-offs were considered unfair in all three scenarios. The population did not consider the situation pertaining to the lay-off. This validates the socialistic character of the Indian population compared to the capitalistic fabric of the U.S. population.

MEDIATION ANALYSIS

In the previous section, it was observed that the respondents in general considered lay-offs to be unfair. However, despite the statistical insignificance of the results, it could be seen that lay-offs due to automation were considered more fair than the other two conditions. Among the other two conditions, lay-offs due to outsourcing were considered fairer than lay-offs due to a merger in the IT industry.

A fairness perception would have its reasons. While it was discovered that perceptions differ, it is critical that the factors that shape these perceptions are investigated. These factors are examined in this section.

To begin with, a set of mediating factors proposed by Jennifer Kim (2018) were used, which are believed to shape the fairness perception among the respondents.

- *Devaluation of Workers*: Lay-offs due to automation are generally perceived to be done to increase productivity, and lay-offs due to outsourcing are generally perceived as an action to reduce costs (Kim, 2018). It is also perceived that the means of life are taken away from an employee when he/she is laid off by an organization. This action, when done in the face of cost-saving, gives the perception that an employee is being commodified or is being devalued by the organization. This thought of the commodification of workers would reduce the perception of fairness among the stakeholders.
- *Short-Term Progress*: The progress of an organisation is also expected to mediate the relationship between the objectives of the lay-off and the perception of fairness of the lay-off. It can be predicted that lay-offs due to automation (increasing productivity) would increase the profitability of the company in the short term, and vice-versa, may or may not be true.
- *Quality of the Services (Output)*: It is generally inferred that a productive worker will have a higher quality output than a cheap worker. Thus, it can be predicted that the quality of the output of a company that lays off to hire more productive workers will be higher than that of an organisation that outsources its operations (laying off to hire a cheaper worker).
- *Motivation*: The motivation behind a lay-off is an important factor that determines the fairness perception among the stakeholders. The motivation of an organisation to improve the efficiency of its operations by hiring more productive employees can be assumed to be fairer in the case of lay-offs. On the other hand, if the motive of the organisation is cost reduction through lay-offs, it can be perceived as less fair.

Perception or judgement on the aforementioned mediating factors is thought to influence fairness prediction in both outsourcing and automation conditions.

Hypothesis

Based on the above mediating factors, it was hypothesised that

- When compared to automation (improving productivity), perception of commodification of employees is higher in outsourcing.

- A company that performs a lay-off to improve productivity (automation) is perceived to make more short-term progress when compared to a company that performs a lay-off to reduce costs.
- Quality of the output of a company which lays off to hire more productive workers will be perceived to be higher than the quality of the output of an organisation which outsources its operations (lay off to hire a cheaper worker).
- Lay-off to hire a productive workforce (automation) would be perceived with a motive to increase capabilities.
- Lay-offs due to outsourcing would be perceived as a motive to reduce costs.

Procedure

Two hypothetical scenarios were considered to analyse the fairness perception between outsourcing and automation.

An Automation Scenario (analogous to increasing productivity or productive replacement): “An IT company is firing a worker in order to hire another person who works at a faster rate than that worker. In this way, the company will be able to give more output for the same cost”
Outsourcing Scenario (analogous to reducing costs or cheaper replacement): “A company is firing a worker in order to hire another person who works at a cheaper rate than that worker. In this way, the company will be able to produce the same output for less cost”.

For each of the above scenarios, multiple declarative statements were posed to the respondents, which are discussed in the following section under each mediator. Each of the statements judges the role of mediators in the perceptions of fairness. The responses to each of the declarative statements were measured using a 5-point Likert scale starting from “strongly disagree” indicating 1, till “strongly agree” indicating 5. The higher the score, the greater the agreement with the given statement.

Responses below were used to determine the mediating factors.

- *Devaluation of Workers*: Two items were used to measure the perceived commodification of employees ($\alpha = 0.76$).
- *Progress/Growth*: Two items were used to measure the respondent's perception of growth or progress of the organisation based on the lay-off decision ($\alpha = 0.81$).
- *Quality of Service*: One item was used to measure what the respondents thought about the quality of the services provided by the organisation based on the motive behind lay-offs.

- *Motivation*: Two major motivating factors for the lay-offs were considered: improving the capability and reducing the costs. One item was used to measure if the respondents thought that the motive behind the lay-offs due to automation was to improve the capabilities. One more item was used to measure if the respondents thought that the motive behind the lay-offs due to outsourcing was to reduce the costs.

Results

The results from the mediation analysis are presented in the table below:

Table 1: Results from the Mediation Analysis

Mediating Factor	Conditions	Mean	Standard Deviation	Test Statistic	Cohen's D
Devaluation of the Workers	Cheaper Replacement/Outsourcing	3.98	0.94	t(103)=-2.094 p = 0.0189 < 0.05	0.29
	Productive replacement/Automation	3.69	1.04		
Short Term Growth	Cheaper Replacement/Outsourcing	3.073	0.887	t (103) = 1.458, p = 0.073> 0.05	0.20
	Productive Replacement/Automation	3.262	0.957		
Quality of Services	Cheaper Replacement/Outsourcing	2.94	0.927	t (103) = 3.783, p = 0.0002 < 0.05	0.50
	Productive Replacement/Automation	3.44	0.987		
Motivation to Improve Capabilities	Cheaper Replacement/Outsourcing	2.806	1.129	t (103) = 6.998, p < 0.0001	0.975
	Productive Replacement/Automation	3.825	0.954		
Motivation to Reduce Costs	Cheaper Replacement/Outsourcing	4.146	0.933	t (103) = -3.947, p = 0.0001 < 0.05	0.549
	Productive Replacement/Automation	3.583	1.107		

Devaluation of the Workers: Consistent with hypothesis 1, it was observed that the commodification of workers is higher in the cheaper replacement/outsourcing condition ($M = 3.98$, $SD = 0.94$) when compared to the productive replacement condition/automation ($M = 3.69$, $SD = 1.04$) with a significant statistical difference, $t(103) = -2.094$, $p = 0.0189 < 0.05$. The value of Cohen's $d = 0.29$ indicates that there is a small effect in the groups. Thus, it can be concluded that the respondents perceive cheaper replacement or outsourcing less fair than automation or productive replacement due to a factor of commodification (as commodification is perceived to be higher in outsourcing conditions when compared to automation conditions). Thus, this factor is considered to be a mediator in fairness perception.

Short Term Growth: It can be observed that an organisation which goes for a productive replacement (automation) is perceived to achieve higher short-term growth ($M = 3.262$, $SD = 0.975$) when compared to an organisation which goes for a cheaper replacement (outsourcing) ($M = 3.073$, $SD = 0.887$), $t(103) = 1.458$, $p = 0.073 > 0.05$. However, the difference is not statistically significant, and the null hypothesis is failed to be rejected and there is no significant difference between the means of the two groups. Thus, the perception of short-term growth is the same in both outsourcing and automation conditions. The value of Cohen's $d = 0.20$ indicates that there is a small effect in the groups. However, the perception is statistically insignificant, and thus, the mediating effect of the short-term growth factor is neutral in both cases. This factor is not considered to be a mediator in the perception of fairness because the results were statistically insignificant.

Quality of Services: It can be observed that an organisation which goes for a productive replacement (automation) is perceived to have an improvement in the quality of the services offered ($M = 3.44$, $SD = 0.987$) when compared to an organisation which goes for a cheaper replacement ($M = 2.94$, $SD = 0.927$), $t(103) = 3.783$, $p = 0.0002 < 0.05$. The difference is statistically significant. The value of Cohen's $d = 0.50$ indicates that there is an average effect in the groups. This is consistent with the third hypothesis that the quality of the output of a company which lays off to hire more productive workers will be perceived to be higher than the quality of the output of an organisation which outsources its operations. Thus, this factor is considered to be a mediator in fairness perception.

Motivation to Improve Capabilities: It can be observed that an organisation that goes for a layoff due to automation is perceived to have a motto of increasing capabilities ($M = 3.825$, $SD = 0.954$) when compared to an organisation that goes for a lay-off due to outsourcing ($M = 2.806$, $SD = 1.129$), $t(103) = 6.998$, $p < 0.0001$. The difference is statistically significant. The value of Cohen's $d = 0.975$ indicates that there is a very strong effect in the groups. This is consistent with the fourth hypothesis that lay-offs to hire a productive workforce (automation) would be perceived as a motive to increase capabilities. Thus, this factor is considered to be a mediator in fairness perception.

Motivation to Reduce Costs: It can be observed that an organisation that goes for a layoff due to outsourcing is perceived to have a motto of reducing costs ($M = 4.146$, $SD = 0.933$) when compared to an organisation that goes for a lay-off due to automation ($M = 3.583$, $SD = 1.107$), $t(103) = -3.947$, $p = 0.0001 < 0.05$. The value of Cohen's $d = 0.549$ indicates that there is an average effect in the groups. The difference is statistically significant. This is consistent with the fifth hypothesis that lay-offs due to outsourcing would be perceived as having a motive to reduce costs. Thus, this factor is considered to be a mediator in fairness perception.

To summarize, except for short-term growth, all other mediating factors have a significant impact on fairness perception. Their sizes is being measured in the next section.

BOOTSTRAPPING PROCEDURE TO ESTIMATE THE EFFECT FROM MULTIPLE MEDIATORS

In a previous study, it was discovered that four mediating factors—devaluation, quality of services, motivation to improve productivity, and motivation to cut costs—have a significant effect on fairness perceptions. The direct and indirect effects of these mediators on fairness perception are estimated and presented in this section.

Bootstrapping procedures were used to see if the fairness perception on lay-off conditions is mediated by the four aforementioned mediating factors. The PROCESS macro, Model 4 by Hayes (2017), was used to estimate the direct and indirect effects. Model 4 is being used as the proposed mediators have parallel mediation effects.

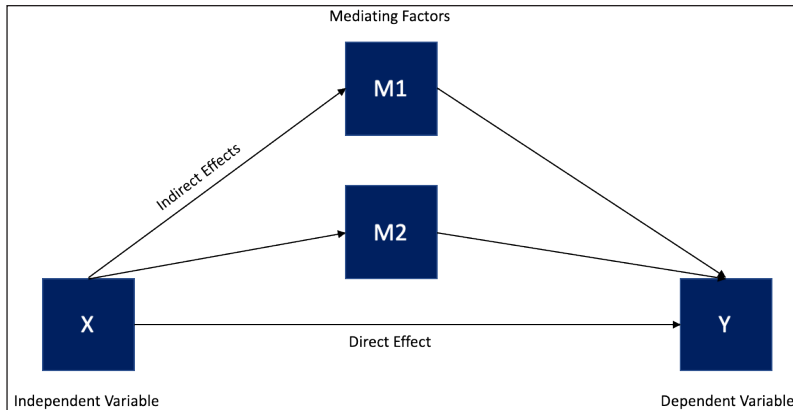


Fig. 1: Mediation Model 4 (Parallel Mediation) by Hayes (2017)

The procedure was performed using Python in Colaboratory, a web IDE from Google. The original PROCESS macro developed by Hayes (2017) was not used. The study used PyProcessMacro 1.0.8, a Python library developed by Quentin André, which is a complete Python reimplement of the Process Macro developed by Hayes. Version 1.0.8 of PyProcessMacro was released on August 17, 2020.

Consistent with the previous results, it was found in the mediation analysis that the lay-off reason of automation vs. outsourcing is a significant predictor of the mediation factors:

- *Devaluation of Workers*: $B = -0.29$, $p = 0.0375$, 95% CI = $[-0.5639, -0.0186]$
- *Quality of Services*: $B = 0.50$, $p = 0.0002$, 95% CI = $[0.2433, 0.7664]$
- *Motivation to increase productivity*: $B = 1.019$, $p = 0.000$, 95% CI = $[0.7339, 1.3049]$
- *Motivation to reduce cost*: $B = -0.56$, $p = 0.0001$, 95% CI = $[-0.8427, -0.2835]$

Next, regression of perception of fairness on the mediating factors and the reasons for the lay-off indicated statistically insignificant effects except for the factor of motivation to increase productivity:

- *Devaluation*: $B = -0.025$, $p = 0.69$, 95% CI = $[-0.1540, 0.1025]$
- *Quality of Services*: $B = 0.141$, $p = 0.071$, 95% CI = $[-0.0114, 0.2950]$

- *Motivation to Increase Productivity*: $B = 0.186$, $p = 0.009$, 95% CI = [0.0465, 0.3256]
- *Motivation to Reduce Cost*: $B = 0.054$, $p = 0.397$, 95% CI = [-0.0708, 0.1787]

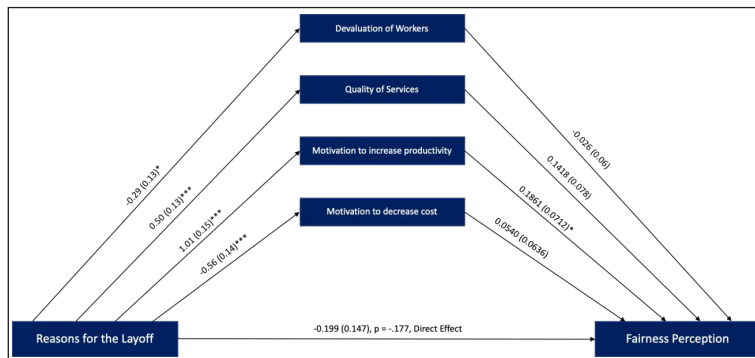
When the model is comprised of mediators as well, the direct effect of the reason of lay-off on the fairness perception was observed to be $B = -0.1995$, $p = 0.1773$, 95% CI = [-0.4884, 0.0893]

It can be observed that there is no statistically significant direct effect or relationship between the reason for the lay-off and the fairness perception. This is consistent with the previous results as well. However, it was found that there is an indirect effect of the reason for lay-off and fairness perception through the 4 mediating factors that were analysed.

5000 bootstrapped samples were used to perform the test of mediation. The indirect effects of each of the analysed mediators are given below:

- *Devaluation of Workers*: Point estimate: 0.0075, 95% CI = [-0.0317, 0.0629]
- *Quality of Services*: Point estimate: 0.0716, 95% CI = [0.0017, 0.1708]
- *Motivation to Increase Productivity*: Point estimate: 0.1897, 95% CI = [0.0524, 0.3563]
- *Motivation to Reduce Cost*: Point estimate: -0.0304, 95% CI = [-0.1171, 0.0451]

It can be seen from the above results that there were significant indirect effects on the fairness perception from each of the mediating factors. Fig. 2 depicts the mediation model for this study.



* $p < .05$. ** $p < .01$. *** $p < .001$.

Fig. 2: Multiple Mediation Model from the Analysis

The effect of lay-off reasons (0 = decreasing cost, 1 = increasing productivity) on perceptions of fairness is being mediated by the effects of devaluation of workers, quality of services, motivation to increase productivity, and motivation to decrease cost. The values in the image represent unstandardised regression coefficients, and standard error is given by the value in the brackets. Since the reason for the lay-off, which is an independent variable, is an indicator variable that is dichotomous, the regression coefficients were not standardised.

To summarize, all the above 4 mediating factors have strong indirect effects on the perception of fairness of lay-offs due to automation and lay-offs due to outsourcing. This is the case, though there is no statistically significant direct effect or relationship between the reason for the lay-off and fairness perception.

DISCUSSION OF THE RESULTS AND MANAGERIAL IMPLICATIONS

In the first analysis, student's t-test was used to test the fairness perception of the lay-offs due to automation and outsourcing and found that there was no statistically significant difference between how the population perceived the lay-offs due to automation and outsourcing. Despite this, lay-offs due to automation were perceived to be marginally fairer when compared to lay-offs due to outsourcing. However, lay-offs in both conditions were perceived to be unfair (mean less than 3 in both groups).

In the second analysis, single factor ANOVA was used to test the fairness perception towards the lay-offs due to three conditions – automation, outsourcing, and merger. It was again found that there was no statistically significant difference between the fairness perception among the three cases. However, the general order of fairness perception in case of lay-offs is found to be automation, outsourcing, and mergers. It must be noted that the differences in perceptions are not statistically significant. It must be noted that the past studies on samples from different geographies indicated that automation and merger conditions would not have any significant differences in terms of perceptions of fairness – the results obtained in this study were contrary.

In the third analysis, this phenomenon was unpacked. The mediating factors that might influence the fairness perception of the respondents to

the lay-off decision were chosen. The mediating factors were analysed using student's *t* test and it was found that all the mediating factors, except one, had a statistically significant influence on the fairness perception.

The analysis was continued to investigate the direct and indirect effects of the mediating factors on the perception of fairness. Bootstrapping procedure was used to estimate the direct and indirect effects of the multiple mediating factors. The results indicated that though there is no direct effect of the reason for lay-off (independent variable) on the fairness perception (dependent variable), all four mediating factors have a strong indirect effect on the fairness perception.

These results indicate that the population of Indian labour force views lay-off as unfair, despite the motive behind the lay-off. The results obtained were consistent with the initial hypothesis of this study that the sample drawn from the Indian labour force might not view the lay-offs due to outsourcing highly unfair, like the results obtained from the sample from the United States (Kim, 2018). Also, the mediation analysis showed that though there is no statistically significant difference between the fairness perception depending on the lay-off reasons, mediating factors like perception of devaluation of workers and quality of services have significant indirect effect on the fairness perception. Also, the motive behind the lay-offs (increasing productivity or decreasing cost) has a significant indirect effect on fairness perceptions, while there was no direct effect. This directly implies that a rightly conveyed motive behind a lay off would better/worsen (impact or alter) the fairness perception among the general stakeholders towards the decision.

Talent resources in an organisation are continuously determined based on the immediate and projected business needs. Just like hiring, firing or lay-off is an inevitable business process. However, the messaging during this activity determines the perception of various stakeholders towards the decision, and this perception will directly affect the brand image of the organisation as a whole. From the obtained results, it is evident that the communicated cause or motive of lay-off determines the perceptions of the stakeholders.

It has been demonstrated through this study that the fairness perceptions of stakeholders towards a lay-off decision depends on motive. Managers/ Executives can utilise this study to determine/test the motives and their corresponding fairness perceptions amongst various stakeholders. The results can be used in drafting internal and external communications

concerning lay-offs. With the motive being clearly communicated in the right way, perceptions can be altered and the brand image of an organisation can be preserved. On the other hand, the results of this study also demonstrate how not to communicate a lay-off decision.

LIMITATIONS AND FURTHER DIRECTIONS

Firstly, random sampling was used for the study. Considering the large size of the population, further studies with similar techniques are required with a larger sample size and stratified sampling techniques to justify/validate the findings in this study.

The study also limits its scope to the Information Technology industry and the millennial population. Though the Information Technology industry in India has largely benefited from outsourcing, automation in the sector is minimum. Sectors like investment banking and manufacturing have rapid penetration of automation technologies and further studies are required to dissect the fairness perception of the population in this sector. Also, studies on multiple age groups are required to assert the results with certainty.

The study employs respondents from the general population. However, the general population is a latent stakeholder in an organization's ecosystem and are generally not affected by the lay-off decisions that organisations take, either to increase productivity or to decrease costs. Thus, studies are required on multiple stakeholders – the lay-off victims, the lay off survivors, and the shareholders, etc., to identify the actual effects of a lay-off decision and thereby, examine the fairness perception of the organization's decision.

The scope of study was limited to understanding the direct and indirect effects of the mediating factors. It was observed that the motives behind the lay-offs are an important mediating factor that influences the fairness perception. A study to analyse the effects of framing a motivating factor (increasing productivity and decreasing costs) on the perception of fairness would be an interesting direction for further research. Studies are required to confirm that a positive framing would have a positive effect on the fairness perception towards lay-off and vice-versa.

Also, this study assumes that organisations execute lay-offs only due to two reasons – to increase productivity and decrease cost. However, there might be multiple other reasons which play in the dynamics of lay-offs. A study that portrays organization's or business's perspective on automation would also be an interesting area for further research.

CONCLUSION

Multiple studies have been conducted on automation technologies and the potential disruption they might cause in the labour market. Much has been said about Industrial Revolution 4.0 and how most of the present jobs will be redundant in the future.

As seen from the literature review, existing literature on automation mostly focuses on the disruption technology will cause in the labour market. Similarly, existing literature on outsourcing mostly focused on the factors that lead to the outsourcing decision—from the organization's perspective. This study adds to the existing literature by investigating participants' perspectives on automation, outsourcing, and lay-offs. This study intends to portray the other side of the picture—the perspective of general stakeholders who are not directly affected by these decisions in an Indian context.

The study provides strong findings on how automation technologies are perceived when they are deployed to enhance productivity in general. The results also explain the absence of hatred towards automation technologies, despite the grim picture presented in the previous literature. The rapid adoption of automation technologies by the business world could be attributed to the general stakeholders' perceived legitimacy of increasing productivity. The study provides concrete findings to prove the perceived legitimacy of automation technologies when compared to outsourcing and other cost-cutting measures in business.

Automation technologies are relatively new and public perception has not been completely formed on the issue. Thus, it is important for organisations to understand the current perception of automation and understand its nuances before adopting the same. There has been enough said about the possible disruptions due to automation technologies, and it is time for further studies to understand the perception of automation amongst the general public.

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