

# Correlates of Industry 4.0 Leader Traits and Sustained Employability: A Study of Manufacturing Sector in Delhi – NCR, India



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**Puja Khatri**

**Sanjeev Kumar**

**Harshleen Kaur Pahwa**

*Guru Gobind Singh Indraprastha University*

(pujakhatri12@gmail.com)

(sanjugahlyan9540@gmail.com)

(harshleen.pahwa@gmail.com)

*Industry 4.0 and IoT has had a considerable impact on changes in business model, strategy formulation, and sustained employability parameter. Businesses need to redefine strategies, implementation modalities and leadership style, to succeed in the new business environment. Leader traits suitable for Industry 4.0 will be mandatory in the coming time for working towards employability sustenance amongst workers especially in the turbulent manufacturing sector. The study found a significant correlation between 4.0 leader traits and employability sustenance. The novelty of the study lies in examining this issue from the prism of gender stereotypes which are ingrained in the societal fabric.*

**Keywords:** Leadership, Industry 4.0, Employability, Manufacturing Sector

## 1. Introduction

We find ourselves today at the brink of the Fourth Industrial Revolution, also called as Industry 4.0, ushering in an era of digital disruption wherein automated, interconnected cyber-physical systems of production are the norm. Smart machines are at the helm of this revolution, driving transformative changes in the employment landscape. Higher efficiencies, improved productivity, lower costs, enhanced flexibility, better agility, safer factories are just some of the advantages offered by the adoption of these new-age technologies in manufacturing. Naturally, to stay competitive in the global market, economies across the world have been drawn to the concept of smart factories. In India too, where Industry 4.0 is still in its nascent stages, the government has been taking steps to ensure the future of manufacturing. The National Mission on Interdisciplinary Cyber Physical Systems, launched in December 2018, addresses issues like technology development, human resource development, skill enhancement and start up development, and is aimed at producing next generation skilled manpower in cyber-physical systems. Ministry of Heavy Industries and Public Enterprises, in realization of Industry 4.0, is situating centers' in the country to aid skill development for small and medium- sized enterprises. In a collaborative effort by Indian Institute of Science and The Boeing Company, India's first smart factory has been set up in Bengaluru. Further, to facilitate adoption of these new age technologies, Department of Scientific and Industrial Research has been setting up 'Industry 4.0 Demonstration Centers' at several institutes of higher education and industrial clusters (Chenoy, Ghosh, & Shukla, 2019).

However, this interaction of the 'real world' with the 'virtual world' is not without challenges. According to a World Economic Forum Report on the Future of Jobs, 'a comprehensive workforce strategy' is essential in order to capitalise on the potential offered by Industry 4.0 (Jagannathan, Ra, & Maclean, 2019; World Economic Forum, 2018). Researchers, practitioners and policymakers throughout the world are worried about the redundancy effects from this digital revolution which may lead to technological unemployment (Hungerland et al., 2015). What was important yesterday, is likely to be redundant tomorrow, bringing into question the employability of the current workforce who are expected to acquire new skills, abilities and traits to sustain in the job market. Thus, the aforementioned macro-level policy changes must be complemented with micro-level changes too. Hecklau, Galeitzke, Flachs, & Kohl (2016) on the basis of a thorough review of literature deduced certain core competencies (technical, social, methodological & personal) that are essential to meeting the challenges posited by this revolution. Of these, one essential social competency that stands out is leadership skills. It has long since been accepted that in times of momentous change, leadership is crucial for success or failure of an enterprise (Darcy & Kleiner, 1991). Manufacturers across the world are in agreement that leaders of this manufacturing revolution require a different approach as well as skillset (Development Dimensions International, 2017). However, the business environment today is characterized by volatility, uncertainty, complexity, and ambiguity (VUCA) and necessitates that dependence on leader be minimised. In fact, one needs to be self-directed enough to be their own leader. Khatri, Dutta & Raina (2019) have elaborated on this line of thinking by identifying such Leader Traits in employees that are essential to thriving in Manufacturing 4.0.

In this paper we try to establish the existence of a relationship between employability of the workforce and leader traits that have been identified as crucial for surviving Industry 4.0. The novelty of the study lies in examining the current issue from the prism of gender stereotypes which are ingrained in the societal fabric.

## 2. Literature Review

Experts across the world have conceded that we are now into the fourth industrial revolution (World Economic Forum, 2016). The earlier three revolutions had transformative impact on the society, bringing to this world mechanization, assembly lines,

and computers. Schwab (2017) opine that this particular industrial revolution stands out from the rest in that it coalesces the physical world with digital and biological worlds, spanning technologies like Artificial Intelligence, Internet of Things, Robotics, Big Data, etc. The horizontal expansion of information and communication technologies is believed to drive this revolution (Lee et al., 2018).

Industry 4.0 was a term first introduced at the Hannover Fair in Germany in 2011, and has since spread to Europe, US and recently, even Asia. Schuh, Potente, Wesch-Potente, Weber, & Prote (2014) define it as “the integration of information and communication technology into the industrial environment”. It involves the application of cyber-physical systems within industrial production systems. Cyber physical systems integrate physical processes with computation and networking. In fact, these cyber-physical systems alongside, Internet of Services, Internet of Things, and smart factories, have been identified as the four main constituents of Industry 4.0 (Hermann, Pentek, & Otto, 2016).

West (2015) view Industry 4.0 as a collaborative interconnection between the digital world and analog production systems. This interconnectedness allows machines, processes and products equipped with artificial intelligence to adapt to the dynamic environment (Hecklau et al., 2016), steering companies towards improved performance (Horváth & Szabó, 2019; Losonci, Takács, & Demeter, 2019) and cost savings (Kiel, Müller, Arnold, & Voigt, 2017). This digitization in manufacturing activities helps companies manage their production processes and related planning and scheduling functions, capacity planning activities (Szalavetz, 2019), relationship with customers etc. (Piccarozzi, Aquilani, & Gatti, 2018). Thus, it is also referred to as smart manufacturing (Hofmann & Rüscher, 2017). (Zezulka, Marcon, Vesely, & Sajdl (2016) identified three mutually interconnected elements of Industry 4.0: digitization of products and services, digitization and integration of networks and new market models.

Industry 4.0 can thereby be outlined as a cornerstone to achieving competitiveness in manufacturing companies of the future (Horváth & Szabó, 2019). However, this revolution, like all others, is not without challenges. Leadership has been identified as an emerging barrier to Industry 4.0 (Horváth & Szabó, 2019). Employees expect more these days from their leaders (Whysall, Owtram, & Brittain, 2019). Helming, Ungermann, Hierath, Stricker, & Lanza, (2019) propose that in order to keep up with the dynamism of Industry 4.0, the managers ought to develop certain Leadership 4.0 competencies. There is a significant amount of literature that discusses the requisite skills of leaders, however a tool that can predict dispositional and behavioural readiness of a leader for Industry 4.0 has only recently been provided by Khatri et al. (2019). They identify cognitive thinking, digital comfort and team sensitivity as 4.0 Leader Traits. (Horváth & Szabó, 2019) also propose personal leadership as an important factor in the times to come, i.e., an individual will need to act as their own leader. In fact, human resource has been identified as one of the most significant barriers to Industry 4.0 (Bauer, Hämmerle, Schlund, & Vocke, 2015; Horváth & Szabó, 2019; Kiel et al., 2017; World Economic Forum, 2018). Why sall et al. (2019) conducted in-depth interviews with senior leaders of engineering led organizations and concluded the presence of a momentous gap between existing capabilities of the workforce and the changing requirements of their job roles. Low employability in the wake of Industry 4.0 has been identified as a problem particularly for BRICS nations (Aulbur, CJ, & Bigghe, 2016). Employability is defined as “the capability to move self-sufficiently within the labour market to realise potential through sustainable employment” (Hillage & Pollard, 1998). Van Der Heijde & Van Der Heijden (2006) stress on the use of competences to obtain and maintain work. Insa, Navarro, Gonzalez and Inesta (Llinares-Insa et al., 2018) use the Bioecological model as the theoretical framework underlying employability and consider it as a meta-competence. They identified five elements of employability: self-control, self-learning, employment protective behaviours, employment risk and job seeking behaviour. Hecklau et al. (2016) identified the major challenges of Industry 4.0 and then based on that deduced a set of four core competences essential to ensuring employment in this digital revolution, i.e., methodological competencies, technical competencies, personal competencies, and social competencies.

While extant literature can be found on employability, as well as leadership traits, there is a dearth of literature when it comes to empirically testing these in an Industry 4.0 environment. Moreover, studies that focus on the leader-like traits exhibited by employees of an organization in the context of the current industrial revolution are significantly limited.

### 3. Hypotheses

Existing literature indicates that leadership competencies are crucial to keep up with the changing workplace (Helming et al., 2019; Horváth & Szabó, 2019), and thereby, maintain employability. Furthermore, for an employed population, male employees perceive themselves to be more employable as compared to females (Cifre, Vera, Sánchez-Cardona, & de Cuyper, 2018). Aybas, Elmas & Dünder (2015) in their study on white collared employees in an industrial enterprise also found that males had a higher level of employability sustenance. Based on the above review of literature, we propose the following hypotheses.

**H1:** There exists a significant difference between male and female employees of select companies of manufacturing sector as regards their level of employability sustenance.

**H2:** There is a significant relationship between Industry 4.0 Leader Traits and the employability sustenance levels in the employees of select companies of manufacturing sector.

### 4. Research Methodology

This research attempts to study the interrelationship between 4.0 leader traits and employability sustenance in the manufacturing sector. It also tries to delve into gender differences in terms of perception of employees regarding plethora of

variables leading to employability.

#### 4.1. Sample

The researchers have applied purposive sampling technique in the present work, wherein a list of 63 manufacturing companies in Delhi was taken from the Ministry of Corporate Affairs website ([www.mca.gov.in](http://www.mca.gov.in)). A criterion of companies having paid up capital greater than INR Two Hundred Thousand was applied to reach to a list of 8 companies. 40 employees each from lower and middle level of the selected companies were administered the questionnaire to reach up to a total of 320 respondents. Out of which 294 completely filled questionnaires were solicited; and thus, the effective sample size utilized for analysis was 294. The data collected was subjected to descriptive analysis.

#### 4.2. Tools Used

The questionnaire comprised of two parts, with part A focussing on demographic details, like gender, age, marital status and level occupied by the respondent in the organization and part B containing specific questions on employability sustenance and leader traits required for Industry 4.0. A 7-point Likert scale ranging from 'strongly agree' to strongly disagree' was utilized for measurement purposes as it yields better results for discriminating power, reliability and validity indices (Preston & Colman, 2000). The following measures were used for realising the objectives of this study

*Employability Appraisal Scale* developed by Llinares-Insa et al. (2018) was utilized for measuring employability of respondents. The 35-item scale comprises five dimensions (a) self-control (b) self-learning (c) employment protective behaviours (d) employment risk and (e) job seeking behaviour. The overall reliability of the scale was observed as 0.93.

*4.0 Leader Traits Scale* developed by Khatri et al. (2019) with an overall reliability of 0.9 was used to assess the Leader Traits possessed by the lower and middle level employees. The three identified dimensions include Digital Comfort, Team Sensitivity and Cognitive Thinking. It comprises 32 items.

### 5. Data Analysis

For the purpose of testing Hypothesis H1 that there exists a significant difference male and female employees of manufacturing sector as regards different dimensions of employability, Levene's t-test for equality of variances has been applied. It was found that there exists no significant difference between employment protective behaviour scores of males ( $M=5.26$ ,  $SD=1.14$ ) and females ( $M=5.30$ ,  $SD=1.06$ );  $t=-0.304$ ). This result suggests that both genders feel equally confident in their ability to exhibit protective behaviours (responsibility, initiative, effectiveness, etc.) in order to maintain their employment. For employment risk ( $t=-1.655$ ), no significant difference was found between men ( $M=3.77$ ,  $SD=1.19$ ) and women ( $M=4.02$ ,  $SD=1.32$ ) suggesting that both have similar perceptions regarding elements of risk for sustaining employment. It was also observed that no significant difference exists for males ( $M=3.29$ ,  $SD=1.60$ ) and females ( $M=3.28$ ,  $SD=1.77$ ) as regards to their job seeking behaviour ( $t=0.56$ ). This indicates that men and women both have similar perceptions as regards to their job search behaviour. For self-control ( $t=-0.822$ ), there exists no significant difference between male employees ( $M=3.42$ ,  $SD=1.52$ ) and female employees ( $M=3.58$ ,  $SD=1.68$ ), indicating that sex of the employee is irrelevant when it comes to practicing restraint in aggravating situations for sustenance of employability. It has also been found that there is no significant difference between males ( $M=5.00$ ,  $SD=1.33$ ) and females ( $M=5.16$ ,  $SD=1.21$ ) concerning their self-learning ( $t=-1.062$ ), suggesting that both genders lay equal emphasis on continuous learning in order to stay employable. Hence H1 is not accepted. This can be attributed to the mounting self-confidence in women with access to better education as well as opportunities, and an overall sense of empowerment. A study on employability in India actually found women marginally more employable than men (The Economic Times, 2016).

**Table 1** Independent Sample T-Test

		Levene's Test for Equality of Variances		T-Test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Employment Protective Behaviour	Equal variances assumed	1.405	.237	-.304	292	.762	-.04082	.13441
	Equal variances not assumed			-.309	236.584	.757	-.04082	.13194
Employment Risk	Equal variances assumed	1.012	.315	-1.655	292	.099	-.24824	.14996
	Equal variances not assumed			-1.610	205.038	.109	-.24824	.15422
Job Seeking Behaviour	Equal variances assumed	2.718	.100	.056	292	.955	.01140	.20178
	Equal variances not assumed			.055	207.001	.956	.01140	.20688
Self-control	Equal variances assumed	.859	.355	-.822	292	.412	-.15703	.19105
	Equal variances not assumed			-.800	205.408	.425	-.15703	.19637
Self-learning	Equal variances assumed	.988	.321	-1.062	292	.289	-.16537	.15568
	Equal variances not assumed			-1.089	240.751	.277	-.16537	.15191

**Table 2** Group Statistics

	Gender of the Respondents	N	Mean	Std. Deviation	Std. Error Mean
Employment Protective Behaviour	Male	186	5.2616	1.13853	.08348
	Female	108	5.3025	1.06174	.10217
Employment Risk	Male	186	3.7694	1.18936	.08721
	Female	108	4.0176	1.32184	.12719
Job Seeking Behaviour	Male	186	3.2876	1.60802	.11791
	Female	108	3.2762	1.76665	.17000
Self-control	Male	186	3.4194	1.51665	.11121
	Female	108	3.5764	1.68191	.16184
Self-learning	Male	186	4.9982	1.32859	.09742
	Female	108	5.1636	1.21131	.11656

The researchers also tried to study the relationship between industry 4.0 leader traits and employability sustenance levels of employees and a moderately positive relationship was found. It was observed that wherever the employees had a high level of Leader Traits, they were exhibiting higher level of employability. In fact, research established that leadership can be used as an instrument to improve employability (Van Der Heijde & Van der Heijden, 2014). The current business environment is such that technical skills required to carry out job tasks are changing rapidly. In such a situation possession of other personal and social competencies, like leader traits, is highly correlated with one's prospects in the labour market. As such, H2 stands accepted.

**Table 3** Correlation between Industry 4.0 Leader Traits and Employability

		4.0 Leader Traits	Employability
4.0 Leader Traits	Pearson Correlation	1	.456**
	Sig. (2-tailed)		.000
	N	294	294
Employability	Pearson Correlation	.456**	1
	Sig. (2-tailed)	.000	
	N	294	294
**. Correlation is significant at the 0.01 level (2-tailed).			

## 6. Discussion

The present study provides empirical evidence of the relationship between employability sustenance and Industry 4.0 Leader Traits in the manufacturing sector. Employees with high levels of employability also exhibit Industry 4.0 Leader traits. Thus, employees who are able to comprehend and apply the voluminous amount of information (cognitive thinking), appreciate individual and cultural differences (team sensitivity), and are abreast of the digital technologies taking over the world (digital comfort), are more likely to sustain their employment in the dynamic Industry 4.0 environment.

Further, it has also been observed that employability sustenance levels are not different for men and women, as opposed to what was hypothesised. That is, both males and females perceive themselves as equally employable. This can be attributed to the current wave of women empowerment that is taking over the world, and by extension, India. Women are now being afforded a better education, have increased access to opportunities, and are, on the whole, becoming more self-dependent. This brings with it a sense of control and autonomy over their own lives. From passive observers, they have moved on to being active drivers of their lives. They are now increasingly contributing to family income, and naturally, this sense of economic empowerment over time, brings with it a sense of confidence in one's own abilities. Thus, this observed parity between the sexes is, in fact, in conformity with the positive trends that shape our 21<sup>st</sup> century world

## 7. Conclusion and Implications

The employment scenario is metamorphosing rapidly. India's manufacturing sector milieu is also undergoing a massive change. With the interaction of social, economic, technological, geo-political and demographic factors, new sets of jobs are being created and others being disrupted in this sector (World Economic Forum, 2017). Industry 4.0 offers great promise if its transformative potential is harnessed appropriately (World Economic Forum, 2016). This posits a challenge for management as the pace of technological advancements is far greater than the adaptation ability of organisations and individuals (Deloitte Global & Global Business Coalition, 2018). At the micro-level, this entails that one has to become adept at anticipating and preparing for impending skill requirements. For one to stay one step ahead, the concept of personal leadership becomes of paramount importance. Employees need to learn to lead this transformation themselves by imbibing traits of a leader.

Management can ensure their workforce stays competitive in the perilous times that lie ahead by facilitating this learning and identifying interventions required for sustaining the employability of the current workforce. There is a need for specialized and updated training for the industry 4.0 leadership traits that should be provided irrespective of the gender to cope up with the changing dynamics of the industry.

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