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Perceptions of Indian managers on impact of convergent technologies on work and resultant organisational performance in service Industry

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Abstract

Purpose: This research examines Indian service managers' perceptions on the impact of convergent technologies (CTs) on their work and resultant organisational performance. The research uses four dimensions - *task productivity, task innovation, customer satisfaction, and management control* - taken together, to investigate the perceived impact of CTs adoption in service organisations context and further examines the resultant organisational performance, based on these dimensions.

Design/methodology/approach: The study used the Partial least squares (PLS) approach to evaluate the measurement model and the structural model. The study was conducted in service industry firms that have made significant progress towards adopting CTs.

Findings: The results of the study demonstrated higher levels of perceived impact of the adoption of CTs on all four dimensions (i.e., task productivity, task innovation, customer satisfaction, and management control). The results of the study also indicate that all the impact dimensions positively influence organisational performance.

Originality: To researcher's best knowledge this is the first study of its kind to evaluate the perceived impact of CTs on organisational performance in the Indian context

Research limitations/implications: The results of the study suggest that all the impact dimensions positively influence the organisation; therefore the service sector managers should be aware of the role of adopting the latest CTs to enhance task productivity, innovation, customer satisfaction, and management control in their job roles.

Practical implications: The practical implications of this research are derived based on the Future of Work, Labour Market Information Systems, Productivity, Enterprise Development, Enhancing skills of service employees, and Employability themes.

Keywords: Future of Work, CTs, Technology adoption, Organisational Performance, Enterprise development, Skills, and Employability

1.0 Introduction

Recent literature on Fourth Industrial Revolution(4IR) indicates that CTs (i.e. information & computer technology -ICT, smartphones, autonomous vehicles, 3-D printing, the Internet of Things (IoT), Customer Relationship Management(CRM), Enterprise Resource Planning (ERP), cloud computing, and Supply Chain Management (SCM) systems and genetic engineering) will have a positive impact on the creation of demand as well as expected to create new markets and jobs (Park et al., 2017).CTs means the integration of various technologies in a single system or device that complement and accelerate each other. It occurs as a synergistic combination of four major branches of science and technology i.e. nanoscience and nanotechnology; biotechnology and biomedicine, information technology, and cognitive science (Roco and Bainbridge, 2003). In addition to these four sciences, the concept of CTs amounts to the inclusion of cognitive and social science, which creates equipment, methods, tools, and business models that improve economic performance (Zhironkin et al., 2019). Given the increasing recognition of CTs as the main component of 4IR, there is a strong interest in ascertaining the level of adoption of the latest CTs, and also identifying how the adoption of the latest CTs impact the work in the service industry as well as resultant organisational performance. More recently due to COVID-19, the movement of consumers to new technology platforms like mobile phones and tablets has lent greater importance to apps, chatting, and artificial intelligence that might have a significant impact on the nature of work and resultant organisation performance of service organisations.

Despite a lot of interest in investment, implementation and adoption of mentioned CTs in the service industry and noted observations that CTs impact economic growth and development, alter industry structures, enable globalization and other performance measures (Grant & Yeo, 2018), question persist on how CTs impact the nature of work and resultant performance at the service industry-level research (Barley, 2015). Previous research does discuss the relationships between technological advancement levels and performance exist (Ayadi et al., 2008; Bloom et al., 2010; Botello & Pedraza Avella, 2014; Kossai & Piget, 2014), but the line of research associated with service industry is still underdeveloped. The lack of research on CTs impact on the nature of the work of service industry professionals and lack of service industry-level research suggests more research is warranted in this direction. Given the increasing reliance on technologies to get work done within and across organizations, the question of how technology is changing work and impacting organisation performance becomes highly salient for scholars

of organizational psychology and organizational behaviour (Cascio & Montealegre, 2016). Thus, the manner in which CTs are altering work settings and the work that people do raise two compelling questions, that is the motivation for this research: What is the impact of CTs on the nature of work of service industry professionals and how it further impacts organisation performance?. Moreover, we discuss these issues in the context of the service industry in India, which is an emerging market.

Thus, the main objective of this research is to interpret the effects of CTs on work and resultant organisation performance within the service industry. We use the Torkzadeh and Doll's (1999) four impact dimensions – '*Task productivity', 'Task innovation', 'Customer satisfaction', and 'Management control'* – to investigate the impact of CTs on service industry managers in India. Additionally, given that previous research has demonstrated that information technology contributes to organisational performance (Melville et al., 2004), that's why this research further treats organisational performance variable as a dependent variable and investigates the resultant organisational performance based on these impact dimensions. The present study thus seeks to fill this void and investigates perceptions of Indian managers on the impact of CTs on work and resultant organisational performance in the Indian service sector.

The research contributes to the existing literature in two ways. First, it addresses the research gap noted in previous literature about the impact of CTs on the nature of work, and secondly, it establishes a link between the impact of CTs on the nature of work and resultant performance. To the best of the authors' knowledge, this is the very first study that examines the impact of CTs on work and resultant organisation performance in the context of the service industry and also an emerging market. The results of the study have the potential to inform service industry professionals to understand the impact of CTs on the nature of the work of service industry professionals and how does it link positively with organisational performance.

The research begins with a literature review that covers India's status as an emerging market, a detailed account of the Indian service sector, and CTs adoption potential of the service sector in India. Section 3 discusses the theoretical background of the study followed by the research model and hypothesis formulation in section 4. Section 5& 6 provides detailed research methodology and data analysis respectively. Section 7 is about the discussion of findings,

followed by practical and theoretical implications (sections 8 & 9) and the last section of the conclusion.

2.0 Literature review

2.1 India as an emerging market

Over the past decade, Indian multinational corporations have made a huge impact in terms of their overseas operations in foreign countries, making India the second leading foreign investor behind China. Much of the focus, however, has remained on investing and operating in more traditional and established developed markets, like the UK, Europe, or the USA. Extant literature observes that those sectors like information technology/IT-enabled services, pharmaceuticals and auto components have made the largest number of acquisitions abroad and acquired targets are located mainly in the developed economies (Singal & Jain, 2012), not only, is India a leading destination for foreign firms when it comes to inward investment (Nigam & Zhan, 2011) but India has also emerged as a major exporter and provider of software and informational technology (IT) services to the world (Arora & Athreye, 2002; Joshi, Singh,& Sidhu, 2012). Traditionally, the major foreign export and investment markets for Indian IT firms have been the United States which accounts for approximately 62%, and Europe, including the United Kingdom which accounts for approx. 24% of the total revenues (Narayanan & Bhat, 2009; Pradhan, 2007). However, due to increasing competition, Indian multinationals are looking towards reducing their dependency on the US market by expanding their market base to newer developed markets, like Australia and New Zealand (Agrawal & Thite, 2003). For instance, in June 2009, Infosys was been chosen by Telstra as a key strategic partner to support its five-year AUD$ 450 million application development and maintenance contact. Similarly, Birlasoft has been named among the top 10 best outsourcing service providers in Australia and New Zealand region, by the International Association of Outsourcing Professionals (IAOP) in their list 2009 Global Outsourcing 100 (Indo-Australian BT Report, 2009).

2.2 Indian service sector

The Indian service sector, in particular, has experienced remarkable growth, playing a critical role in enabling the country to become one of the fastest-growing emerging markets in the world. The service sector accounted for 53.66 % of the country's Gross Value Added (GVA) (Jana et al., 2019), and it was up 40 % from that of 1980, exceeding the shares of both the agricultural and manufacturing sectors (Economic Survey, 2016-17). It is also the second-

highest employer, at around 31% (after agriculture which employed 47%) of the population between 2016-2017 (GOI, 2018). India's service sector can be categorised into three groups. The first group consists of education, health, and defence; the second includes trade, transport, and hotels; and the third comprises business services, including banking and insurance, information technology (IT) services, such as software and communication, and legal services. The third group, in particular, has demonstrated rapid growth emphasised by the service requirements of high technology-oriented manufacturing firms (Balasubramanyam & Virmani, 2018).

India's service sector comprises both large organisations (airlines, telecoms, IT companies, banks, and insurance companies) and an estimated 10-50 million micro-small-medium-enterprises (MSMEs). These MSMEs include accountants, caterers, car cleaners, yoga instructors, flooring contractors, roof leak repairers, interior decorators, movers, and packers among others (GOI, 2007). Given that MSMEs face various problems such as lack of capital, unsustainable businesses and excessive regulations concerning start-ups, the running, and closure of businesses (Economic Times, 2018), any discussion concerning the adoption of CTs as part of the 4IR are inherently problematic. However, given the scale of MSMEs and the 'teething problems' they face, a recent survey covering 2250 MSMEs across different industries in thirty-four cities in India found an encouraging trend towards technology adoption (Goenka, 2019). The results of the study indicated that 35% of MSMEs have already adopted business management software; and of these, more than 40% already use digital banking and payment services, with another 40 % likely to adopt them soon (Goenka, 2019).

2.3 Indian service sector's technology adoption potential

In OECD countries, it has been observed that services sectors are typically the most intensive users of information technology (Pilat & Devlin, 2004), since the service sector is information-intensive, and it requires well developed IT systems to enable improved service performance (Uwizeyemungu & Raymond, 2011). India is on the verge of rapid diffusion and adoption of latest converging technologies such as mobile internet (with a potential reach of 700 million to 900 million Indians by 2025), cloud-based services, the automation of knowledge work, digital payments, and verifiable digital identity, that can transform the Indian service sector (McKinsey, 2014). Moreover, the Indian government's 'JAM trinity,' of the Jan Dhan Yojana (banking for all scheme), Aadhaar number (a unique identification number for each citizen)

and mobile phones, have ushered a data revolution, changing the financial landscape of India and thus acting as an enabler for paving the way for the foundation for a digital service economy (IBEF,2015; McKinsey, 2019). The penetration of telecommunications technology and the potential of upgrading broadband technology are added tools in the hands of service industry providers to affect changes that can make the Indian service industry technology compliant (Saran and Sharan, 2018). Moreover, as per a joint report prepared by FICCI, NASSCOM and Ernest and Young, the rapid adoption of exponential technologies in the advanced markets and its impact on off-shoring, increasing/shrinking overseas job market for Indian workforce and level of FDI flows among other is mentioned as one of the twelve megatrends that will impact the future of jobs in 2022 (FICCI, NASCOMM $ EY., 2017). The new business service models are increasingly relying on e-commerce and mobile-based e-tailing and consequently creating new job profiles in logistics, warehousing, web and app design, system integration, customer service, big data, and machine learning (ET Retail, 2017).

3.0 Theoretical background

3.1 Convergent technologies and work

Work in the context of this research can be defined as the application of human, informational, physical, and other resources to produce products/services (Alter 2013). Probably, the first study pertaining to the study of the work implications associated with the adoption of CTs was published by Zuboff (1988) in her seminal book – *'In the Age of the Smart Machine: The Future of Work and Power'*. The book discussed the nature of information and its significance in restructuring and redefining the patterns and meanings of work - even though at that time the internet was not diffused into the work culture. More recent research has observed that technology will change the nature of work and new CTs will usher in new practices in the workplace and render old ones obsolete (Ra et al., 2019). The development of automation enabled by CTs including robotics and artificial intelligence brings the promise of higher productivity and prospects of economic growth, increased efficiencies, safety, and convenience (Manyiaka, 2017). Previous research has observed that CTs that enable employees to track their activities enhance productivity by helping workers to understand to reallocate their time, tasks, and activities to accomplish goals at work more effectively (Osman 2010). Two of the main consideration of adoption and implementation of CTs are efficiency/effectiveness (time to complete a task/reduction in error rate) (Gillan, lewis & Bias 2014) and economic

implications. Thus, based on this premise this research probes two strands; first, what are the elements/aspects of nature of work that is affected by CTs, and secondly, and how these aspects further impact upon resultant organisation performance?

For examining the impact of CTs on the nature of the work of service professionals, the obvious first step is to categorise the impact dimensions. Scholars and service industry managers are still debating strategic and tactical approaches concerning the successful adoption and use of information technology. As a result, a plethora of studies has investigated the categories of adoption, utilisation, or success at the organisational and individual levels (Ul-Ain et al., 2019). Although there is considerable research assessing the success of the implementation of information technology within organisations (see, for example, DeLone & McLean's IS Success Model, Technology Acceptance Model -Davis, 1989; DeLone & McLean, 2016), there is limited research in scale and scope that investigates the impact of CTs on the nature of work (Chesley and Johnson, 2010).

Most of the previous studies regarding CTs' impact are related to specific industries (i.e education, clinical care, transport sector, primary sciences), and only a few studies have discussed the impact of CTs in relation to the nature of work or workers. For example, Osterlund and Robson (2009) studied the impact of CTs on work-life experiences, while Korunka and Hoonakker (2014) investigated the impact of CTs on quality of working life. Similarly, De Wet et al. (2016) studied the impact of CTs on individuals or employees but with a focus on certain ICT devices or applications. Perhaps, Torkzadeh and Doll's (1999) study was the very first study that ventured in the direction of development of a tool for measuring the perceived impact of CTs on work. They developed explicit definitions for four impact dimensions based on an extensive review of the information technology literature. The four impact dimensions identified were task productivity, task innovation, customer satisfaction, and management control - taken together, they describe `how' technology adoption and its application may impact employees in an organisational context. This research uses these four dimensions to investigate the perceptions of Indian managers in the service sector for the adoption and application of the latest CTs.

3.2 Convergent technologies and organisational performance

In the context of this research, the performance impact refers to both tangible and intangible benefits and changes in relation to the performance that is achieved with the implementation of CTs (Palvalin et al, 2013). A careful review of the literature reveals that studies examining the association between CTs and organizational performance are divergent in how they conceptualize key constructs and their interrelationships (Melville et al., 2004). Melville et al (2004) further propagated the concept of *'IT Business Value',* that commonly refers to the organisational performance impacts of IT. This term includes productivity enhancement, profitability improvement, cost reduction, competitive advantage, inventory reduction, and other measures of performance (Devaraj & Kohli 2003). Consoli (2012) observed that CTs impact on performance can be categorised and analysed through indicators such as efficiency, effectiveness and competitiveness, innovative business, and intangible benefits. Similarly, Tarutė and Gatautis, (2014) also observed that CTs can have a powerful impact on the economic performance characterized by a high degree of technological progress and productivity. More recent research concerning the impact of CTs on organisational performance discusses CTs in terms of its impact on innovation and resultant organisational performance (Gërguri-Rashiti et al.2018; Yunis et al., 2018). The authors, in a bid to establish a direct link between CTs and impact on the nature of work and the resultant impact on organisational performance use four dimensions given by Torkzadeh and Doll's (1999). Thus, this research treats four dimensions of Torkzadeh and Doll's (1999) as independent variables, organisational performance as a dependent variable and investigates the resultant organisational performance based on these impact dimensions. The research model is depicted in the following figure:

Figure 1 goes here

4.0 Hypothesis formulation

4.1 Perceived task productivity and organisational performance

Task productivity as an impact dimension can be defined as the extent that a technology application improves the user's output per unit of time (Torkzadeh & Doll, 1999). Value

creation through CTs in the form of task productivity has the potential to influence organisational performance (Arora & Rahman, 2017). The link between task productivity and organisational performance has been theorised in *'Performance Impact Theory'* (See Goodhue & Thompson, 1995). The *Task Technology Fit (TTF)* framework proposed by Goodhue and Thompson (1995) refers to the matching of the capabilities of the technology to the requirements of a particular task and its impact on performance. Performance impact can be defined as the degree to which the use of latest CTs help to accomplish the task quickly, allows control over the task, enhancing task efficiency and effectiveness, problem identification speed and increases task productivity (Benedetto et al., 2003; Hou, 2012**;** Norzaidi et al., 2007; Wu & Wang, 2006).

Extant literature has observed that CTs impact in the service industry can relate to both the service output experienced by a customer (e.g., satisfaction, outcome, and value) and as well as the input of service industry professionals (i.e. completing the task within time and with the best effort) (Parasuraman, 2002; Johnston and Jones, 2004). Here, in the context of this research, we assume that the use of CTs is correlated with task productivity of an individual worker (i.e. worker productivity, performance, and value creation) (Aral et al., 2012), that leads to enhanced organisational performance. The fit of the latest CTs and tasks can create advantage-creating digitised bundles that can lead to an improvement in the quality of decision-making, idea generation, and increased individual performance that may lead to enhanced organisational performance (Brown et al., 2010 Lai et al., 2010). Moreover, the adoption of CTs should help integrate task knowledge collectively, decreasing errors, and reducing the duplication of effort and leading to superior task productivity (Akgun et al., 2008).

There is plenty of research that examines a positive impact of CTs on improving overall productivity and organisational performance of a firm (Albu, Albu, Dumitru, & Dumitru, 2015; Dimelis & Papaioannou, 2011), though there is scant availability of research and empirical data that connects task productivity of workers (i.e. task productivity) with organisation performance in the service industry (Melián-González & Bulchand-Gidumal, 2016). Even the scant research testing relationships between specific IT mediated tasks and measures of organisation performance has observed inconclusive results regarding the direct relationship between IT deployment and performance (Hua et al., 2015). Though Cohen and Olsen(2013) study concerning the hospitality service industry observed significant

performance impact due to the use of the system of IT resources again, there was no in-depth inquisition into the role of enhanced task productivity due to use of IT. Even in the context of the Indian service industry, there are instances of research that point a positive impact of CTs on enhanced productivity levels of the enterprises (Balasubramanian et al., 2011; Padma et al., 2010; Rani, 2015; Singh & Tigga, 2012), but to the best of authors' knowledge no study has linked task productivity of service professional with organisational performance. Thus, keeping in view the scarcity of research in this domain, this research examines the following hypothesis:

> ***H1:*** *Perceived task productivity due to the adoption and application of CTs is directly and positively related to organisational performance*

4.2 Perceived task innovation and organisation performance

Task innovation amounts to the extent that individual employees tend to try and create new ideas in their work (Torkzadeh & Doll, 1999). The main essence of task innovation is the cumulative effect of CTs on the innovation of specific tasks performed by workers of an organisation. The use of new CTs reflects the ability of the service firms to employ and deploy the collective resources and skills of all actors for innovative activities involving new products, services, processes and organizational systems, that have the potential to add value for the organization (Agyapong et al., 2015). Previous research has observed that deployment of CTs augments incremental innovative capabilities of service employees – both directly and through improved task assistance, and further influence an organisation's performance outcomes (Subramaniam & Youndt, 2005). As such, the implementation of CTs does not directly stimulate organisational performance, without the complementary development of task innovations in the nature of work. CTs facilitate high levels of integration and sharing among different functional teams through complex coordination, communication, information-sharing, cooperation, and conflict resolution processes, which in turn influences task innovation among different teams (De Clercq et al., 2009; Song & Swink, 2009). Organisational performance is enhanced when a certain number of tasks in the service industry are innovated complemented by CTs initiatives that fit with existing processes, promoting increased customer loyalty, and stimulating demand for other products (Fairbank & Williams, 2001; Frishammar and Hörte 2005).

Though previous research has observed a positive link between generic IT innovation and a range of desired performance outcomes (Garcia-Morales et al., 2011; Han et al., 1998; Hogan & Coote, 2014), but most of the previous studies either focus on the diffusion of innovations within one or more organisations or probe the association between a measure of organisational innovativeness and various organisational variables (Damanpour & Evan,1984). No study has examined the relationship between task innovation and organisation performance. Even in the context of the Indian service industry, there is negligible research linking task innovation and its impact on organisational performance. A few studies do closely venture into this stream but they are mostly on service innovations (Alam, 2013; Thakur & Hale, 2013) and the industry as a whole (i.e. banking)(See Gupta et al., 2015; Kapoor et al., 2015). Nonetheless, this research proposes that organisations that adopt the latest CTs contribute to task innovation, and this results in positive organisational performance outcomes.

H2: *Perceived task innovation due to the adoption and application of CTs is directly and positively related to organisational performance*

4.3 Perceived customer satisfaction and organisation performance

Customer satisfaction is the extent that the adoption of technology and its application helps the user to create value for the organisations' internal or external customers (Torkzadeh & Doll, 1999). There exists a close relationship between service quality, productivity, and customer satisfaction (Filiatrault et al., 1996). Improved service quality is perceived through close interaction and real-time flow of information which helps service industry employees to speed-up client queries or implement client requests, increasing customer satisfaction (Torkzadeh & Doll, 1999).

Customer satisfaction is viewed as critical predictors of future sales growth and other performance measures (Ahearne et al., 2005). The customer relationship management literature suggests that IT services provide support for the implementation of *relational information processes (systematise the capture and use of customer information*) that play an important role in establishing long-standing relationships with customers, establishing effective direct interfaces with customers and enhancing the performance of the various boundary-spanning roles found throughout the organisation (i.e. CRM) (Ahearne et al., 2005; Jayachandran et al.,

2005; Trainor et al., 2011). Adoption of the latest CTs are expected to have a positive impact on performance through increased customer satisfaction that translates in more revenue generation, and at the same time, it reduces costs through increased efficiency (Rust et al., 2002). Successful adoption of the latest CTs can have a direct influence on organisation performance through cost position and return on investment as well as an impact through enhanced customer relationship performance (Trainor et al., 2011). In the Indian context also, previous research has reported a positive impact of CTs on customer satisfaction and resultant performance (Singh, 2011; Venkatesh et al., 2010, 2016). Thus the following hypothesis:

> ***H3:*** *Perceived customer satisfaction due to the adoption and application of CTs is directly and positively related to organisational performance*

4.4 Perceived management control and organisation performance

Management control as an impact dimension can be defined as the process by which managers assure that the latest information technology applications are being used effectively and efficiently in the accomplishment of the organisation's objectives(Torkzadeh & Doll, 1999). Based on agency theory perspective as an aspect of performance management practice, Karake (1995), it can be argued that using CTs as a means of management control help managers could protect their interests as well as those interests of the stakeholders to successfully manage performance(Kagaari et al., 2010). Previous research has emphasised the importance of CTs in delivering effective and efficient internal controls that enable an organisation to process large volumes of transactions, enhance the usefulness of the information and facilitate information analysis (PCAOB, 2007). Through the aid of CTs, the management of the organisation can utilise prior business transactions to formulate expectation about future performance (Li et al., 2012), and these automated means of management control (i.e., originating, processing, storing, and communicating information) can lead to enhanced organisation performance.

Enhanced information management capability with the help of latest converging technologies can help organisations to provide data and information to users in the organisation with the appropriate levels of accuracy, timeliness, reliability, security, confidentiality, connectivity, and access and the ability to use it effectively for changing business needs and directions (Mithas et al., 2011). Enhanced information management capability due to CTs can help organisations to develop appropriate monitoring, evaluation, and control systems to observe

business performance and guide managerial actions (Bourne et al., 2002; Kaplan & Norton 1992), and to develop process management capabilities for guiding manufacturing, supply chain, software development, financial, and other important activities (Ramasubbu et al., 2008; Sambamurthy et al., 2003). All these control activities and process management capabilities enhance management control of a business and have the potential to impact organisation performance positively.

Previous literature concerning Indian service industry is very limited in the domain that links management control with organisation performance, but some studies have observed that use of CTs help service managers to ascertain some level of control in the process with which new service innovations are developed and delivered to the market (customer)(Rajput & Gupta, 2011; Thakur & Hale, 2013). Thus based on these observations, we propose:

> ***H4****: Perceived management control due to adoption and application of CTs is directly and positively related to organisational performance*

5.0 Research Methodology

The data for this research was collected using a structured questionnaire which comprised of two parts - one related to the demographic profile of the respondents and others pertaining to the measurement items of the construct. The items of the construct were adopted from an already validated scales. Items for the independent variables (i.e., perceived task productivity, perceived task innovation, perceived customer satisfaction, and perceived management control) were adapted from a scale developed by Torkzadeh and Doll (1999), and each variable consisted of three items. Examples of items used included: "the application of AI/Robotics saves time for different tasks" for task productivity; "the application of AI/Robotics improves customer service" for customer satisfaction; " the application of AI/Robotics help employees create new ideas" for task innovation; "the application of AI/Robotics helps management control the work process" for management control. Perceived organisational performance was measured using the six-item scale adapted from Elbashir, Collier, and Davern (2008). The sample item for organisational performance included "the application of AI/Robotics will help organisation in increased revenues".All the items were measured on a five-point Likert scale, where 1 denoted strongly disagree, and 5 denoted strongly agree. The study uses subjective perceptions to measure four impact dimensions as well organisational performance in line with

the observations that there is a high correlation and concurrent validity of subjective data on performance (Venkatraman & Ramanujan 1986). Thus, survey questions were more open to offering service manager's general views, than to offering precise quantitative data.

The survey was conducted with the help of 150 MBA students who studied business research methods course in a reputed Indian university in the Northern region. The students were introduced to the purpose of the research and each construct involved. Students were delivered a special lecture to acquaint them with how and from where data has to be collected. Students were advised to collect data from respondents who were aware of the advent of CTs on their firm, and how their implementation helped their firms. The technique of probing was explained and suggested for identifying suitable respondents. Each student was asked to collect three responses from three different organisations in the service sector in the Northern Indian region. Data collection was restricted to organisations that had already adopted the latest CTs to an extent or were using the business intelligence systems for their business activities. Data were collected in person, and as well as through online google forms to have wider reach and speed. The online survey technique has been used in earlier studies as both the single and additional survey methods (Elbashir, Collier & Davern, 2008). A total of 375 usable responses were received. The data was validated by making random calls to respondents, and email ids were verified to ensure the authenticity of the data to avoid surrogate information. Further, responses were tested for the assumption of normality and multicollinearity. Responses were found to be fit for further analysis.

Demographics analysis was undertaken to explain the breakdown of the respondents in terms of the group, form of organisation, number of employees, and type of industry (See Table 1). From the sample of 375 respondents, 49.3% of respondents hold top-level or managerial level positions and 50.7% represent were holding positions at the supervisory level, department head, and others (See Table 1). Out of 375 companies surveyed, 207 (55.20 %) were companies operating at the national level, whereas 168 (44.8%) were functioning at the international level. Based on the number of employees, 138 (36.8%) enterprises employed between 1 and 100 employees, 35 (9.3 %) 101-200 employees, 50 (13.3 %) represented 201-500 employees, 40.5 % employed over 500 employees. Although the sample varied across different industry types, the majority of respondents were from the IT sector and banking, financial, and insurance companies which represented 20.0% and 15.7 %, respectively.

Table 1 goes about here

6.0 Analysis and results

The conceptualised model was analysed using the partial least squares (PLS) approach. Smart PLS Version 3.2.8, was used to evaluate the measurement model and the structural model (Hair, Hult, Ringle, and Sarstedt, 2017). Smart PLS was used for analysis as it can simultaneously assess the measurement model and structural model, and works efficiently with small sample sizes and makes practically no assumptions about the underlying data (Hair et al., 2017). Since this study was based on self-reported data, the potential issue of common method variance (CMV) was analysed (Podsakoff, MacKenzie, Lee & Podsakoff, 2003). Harman's single factor test was used to analyse CMV. The CMV is a problem when a single factor emerges outs, or one factor accounts for significant covariance (Podsakoff et al., 2003). Exploratory Factor Analysis (EFA) was performed to test the issue (Podsakoff & Organ, 1986). The results of EFA showed their exist at least five factors and the most significant single factor explaining 23.45 percent of the variance. Thus, data was found to free of common method bias (Podsakoff et al., 2003).

6.1 Measurement model

The measurement model was assessed for internal consistency, convergent validity, and discriminant validity (Figure 2). All outer loadings of measurement items were found to be above the threshold value of .70, except three items (Table 2). Composite reliability (CR) and average variance extracted (AVE) were above the recommended value of 0.7 and 0.5, respectively (Table 2). Hence, the convergent validity of constructs was established (Hair et al., 2017). Reliability was evaluated using Cronbach alpha. All constructs had Cronbach alpha above the threshold value of 0.7. The results indicated that the constructs in this research possessed a high level of internal consistent reliability (Fornell & Larcker, 1981).

Figure 2 goes about here

Table 2 goes about here

Further, Fornell and Larcker's (1981) criteria was used to examine discriminant validity. The square root of AVE for each construct was higher than the inter-construct correlations. From Table 3, it can be seen that the values in the diagonals are higher than the values in their respective row and column, thus indicating that the measures used in this study are distinct, demonstrating adequate discriminant validity (Table 3).

Table 3 goes about here

6.2 Structural equation modeling – Partial least squares

The structural model was estimated using a bootstrapping technique with a re-sampling of 500. The predictors were checked for multicollinearity using VIF values for each construct, which were lower than the recommended value of 5 (Hair et al., 2017). The authors calculated the $R^{2,}$ i.e. variance explained by the exogenous variables (Hair et al., 2017). All four variables together explained 54 percent of the variance for the dependent variable (i.e., perceived organisational performance, Figure 3). The overall model was assessed for fit by using standardised root mean square residual (SRMR) testing as an index for model validation (Henseler et al., 2014). Generally, values below 0.08 are considered favorable (Hu & Bentler, 1999). The model resulted in an SRMR value of 0.03, which was under acceptable limits. Another critical aspect of the evaluation of the structural model is the predictive relevance of the model. For this purpose, the Stone-Geisser's Q^2 is examined with the use of a blindfolding procedure using omission distance of 7. Blindfolding is a sample reuse techniques to evaluate Stone-Geisser's Q^2 value (Stone 1974; Geisser, 1974). The results yielded positive Q^2 values, which suggested that the model had predictive relevance (Hair et al. 2017).

Further, for the robustness of results, a path analysis was performed to test the hypotheses by running a bootstrapping procedure in SmartPLS 3.0 (Figure 2). Table 4 shows the results regarding the significance of the hypotheses, which include the path coefficients and t-statistics. Table 4 indicates that all hypotheses were supported. The results showed that perceived task productivity is positively related to perceived organisational performance (β= 0.196, $p<0.05$); thus, H1 was supported. With regards to the path coefficient of perceived task innovation (β= 0.187, $p<0.05$) and perceive customer satisfaction (β = 0.158, $p<0.10$), the

results indicate that both are significant and positively related to perceived organisational performance. Hence, H2 and H3 are supported. The results also demonstrated that perceived management control (β= 0.243, p<0.05), was positively related to perceived organisational performance; thus supporting hypothesis 4.The results of this study indicate that perceived customer satisfaction is the most significant predictor of perceived organisational performance, followed by perceived management control and perceived task productivity. Thus, the higher the level of perceived customer satisfaction, the better would be the perceived organisaitonal performance.

Figure 3 goes about here

Table 4 goes about here

7.0 Discussion

In the quest for determining the impact of adoption and application of CTs on work, this research examined the perceptions of Indian managers and the resultant organisational performance based on the four impact dimensions. The results of the study demonstrated higher levels of perceived impact of the adoption of CTs on all four dimensions (i.e., task productivity, task innovation, customer satisfaction, and management control). Table 4 shows that perceived management control had the most positive impact on organisational performance (β= 0.243, p<0.05), whereas perceived customer satisfaction, had the least impact (β= 0.158, p<0.05). This supports the fundamental notion that management control is essential for effective implementation of any system to prosper, leveraged, and incorporate the technology into organizational processes (Masrek & Hussein,2007). On the contrary, perceived customer satisfaction has the least impact on organisation performance. This highlights the importance of internal factors (i.e. task productivity, innovation, and control) as the main factors that impact on the performance of the organisation due to the use of CTs. The perceived enhanced task productivity due to the adoption and application of the latest technologies gels well with the previous literature that endorses that higher system quality based on the latest CTs lead to

higher user satisfaction and use, leading to positive impacts on individual task productivity (DeLone & McLean, 2003). Further, given that current literature demonstrates that organisational information systems assisted with state-of-the-art technology appear to be intelligent, communicative, stimulating, enhancing employee productivity, unveiling opportunities, and opening new pathways to innovation (Shneiderman et al., 2006), the results of the study confirm those results as CTs enhance task innovation. Thus, it can be assumed that generative fit of a service organisation – *the extent to which an IT artifact is conducive to evoke and enhance the generative capacity for innovation (*Avital & Te'Eni, 2009) – relies mostly on adoption and application of latest CTs, and help enhance employee's ability to innovate their tasks.

The positive impact of adoption and application of the latest CTs on customer satisfaction can be explained on the basis of two reasons. First, through the use of the latest CTs, the service organisations can use the latest *Customers Relations Management (CRM)* applications that enable organisations to customise their offerings for each customer (Mithas et al., 2005). Secondly, CRM applications can help service organisations to manage customer relationships more effectively across the stages of relationship initiation, maintenance, and termination (Reinartz, Krafft, & Hoyer, 2004). Last but not least the results that adoption and application of latest technology enhance management control indicates that establishment of sound information systems in a service organisation through proper investment in latest CTs ensure that resources are obtained and used effectively and efficiently in the accomplishment of the organisation's objectives that further impacts organisational performance.

The extant literature has highlighted numerous examples of successful adoption and application of information technology, providing improved profitability and improved organisational performance (i.e. Devaraj & Kohli, 2003; Hendricks et al. 2007; Melville et al. 2004; Sabherwal and Jeyaraj, 2015). The results of this study indicating that all the impact dimensions positively influence organisational performance further contribute to the existing literature by settling for specific four prescribed dimensions (Tarkzedah & Doll, 1998) and how they positively influence organisational performance. But these results should be treated with caution as the previous research has also observed that adoption and application of latest technologies have also lead to negative consequences for some organisations in terms of financial losses and other risks (Bruque et al., 2008; Laumer et al., 2012; Maier et al., 2013).

8.0 Practical implications

In the information age characterised by Fourth Industrial Revolution (4IR) and Future of Work (FoW) the service industry scenario is changing rapidly due to the effect of CTs. Given the witness of reliance of the service industry on the latest CTs in wake of COVID-19, it is very likely that within the next couple of years, CTs will have a great impact on all areas of the service industry. The contemporary organizations will slug out in the ever-competitive era and would race to apply the latest CTs to find ways to acquire a competitive advantage. The actual application of ICT requires numerous changes in human resources. As per the finding of the study, the increasing availability of the latest CTs could significantly impact task productivity, innovation, customer satisfaction, and management control in Indian service industries. Thus, the results of this study may be particularly crucial for the managers in the Indian service industry to understand the impact of CTs on the nature of work and associated business service processes. The finding suggests that management control is the most important impact dimension which is influenced by CTs, thus service industry managers can use the latest CTs to enhance management control that may help them inform the design, implementation, monitoring, and evaluation of policies that are better focused and targeted.

Further, given that the identification of labour market issues critically rests on the availability of data, information, and analysis (ILO, 2019), the results of the study indicate that use of the latest CTs would be able to provide and exchange data to the service industry professional and policymakers, that would help in recruitment and selection of appropriate service professionals. Moreover, given that raising productivity for ensuring that the productivity gains are equitably shared between business owners and workers (higher wages and better working conditions) is of critical importance to reduce poverty (ILO, 2015), the results of the study that adoption of CTs enhances task productivity and innovation can fuel the skills and improve the work environment of service sector employees thus improving their living standards.

The results of this research also underline the importance of investment in the latest CTs on the part of Indian service sector industries, which is mostly characterised by small and medium enterprises (SMEs), that can help improving working conditions, competitiveness, and productivity. Last but not least, the results of this research tie in well with skills and

employability thematic areas of '*Sustainable Development Goals (SDG Goal 8)*' prescribed by the UN. The access to the latest CTs has the potential to build the capacity of individual enterprises in relation to productive activities, decent job creation, and creativity and innovation, thus making them sustainable enterprises (See key themes of SDG 8.3). The more onus on adopting the latest CTs and further developing skills of the Indian service sector professionals can enhance their employability chances and thus serve the platform for providing decent work to one and all.

9.0 Theoretical implications and future research

The increasing reliance on CTs to get work done across service organisation and how CTs impact the nature of work and resultant organisational performance is highly salient for scholars of organizational psychology and organizational behaviour professionals. These scholars are inherently concerned with how CTs impact the nature of the work and how this translates to resultant organisational performance. Thus, this research provides answers to these questions and this may have profound implications for existing research and future research. As mentioned previously all the previous studies concerning the impact of CTs only discuss the impact of CTs on total productivity, innovation, control, and performance of an organisational, without any link to how CTs impact the individual nature of work. This research plugs this missing link by demonstrating the association between CTs impact dimensions and resultant performance and thus answers the research questions of the study. The results of the study confirm that adoption and implementation of CTs impact the nature of work of service professionals and all the impact dimensions positively influence organisational performance. In sum, the results of the study provide valuable insights regarding what we know about the impact of CTs on the nature of the work of service industry professionals and resultant organisational performance. The organizational psychology and organizational behaviour scholars might further usefully draw upon the results of the study to enhance understanding of specific aspects of the relationship between CTs, nature of work of service industry professionals, and resultant organisational performance.

Further studies inkling the role of '*IT governance mechanism'* and *'Strategic alignment'* of CTs (Wu et al., 2015), are other areas of concern that future researchers can investigate to examine the impact of CTs on task productivity, innovation, customer satisfaction, and management control. Future researchers can always investigate the impact of task productivity

and innovation on customer satisfaction and also the mediating role of customer satisfaction among task productivity, innovation, and resultant organisational performance. Similarly, the role of management control can be investigated as a moderator between the adoption of new technologies and task productivity and innovation. Moreover, the authors suggest that the role of *'Internal process efficiency'*, one of the factors of business process performance (See Aydiner et al., 2019) can be examined as the mediating variable among the relationship between impact dimensions and organisation performance. This will ensure understanding of how impact dimensions lead to internal process efficiency that finally attributes to organisational performance.

10. Conclusion

The Fourth Industrial Revolution (4IR) and Future of Work (FoW) provide huge opportunities for the service sector in India. With the help of the latest CTs, Indian service organisations can make inroads into the best customer experience and service efficiency. The results of the study based on the perception of managers in the Indian service sector demonstrate that adoption and application of the latest technologies can enhance task productivity, task innovation, customer satisfaction, and management control. Further, these impact dimensions have a positive influence on the resultant organisation performance. Given that the Indian service sector is the mainstay of the Indian economy and most of the SMEs demonstrate an encouraging trend towards technology adoption, thus the results of the study confirm that this will ensure enhancement in task productivity and innovation, customer satisfaction, management control, and the resultant organisational performance. There is great potential for researchers to further deepen the understanding and prediction of the impact of CTs on the nature of work of service industry professionals and resultant organisational performance, while also generating important implications for practice.

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Table 1: Sample Demographics –position, industry, organisation type and number of employees

Position in Organisation	***Frequency***	***%age***	***Cum. %age***
CEO/Director	32	8.53	8.53
Top level manager	28	7.47	16.00
Middle level manager	104	27.73	43.73
HR manager	21	5.60	49.33
Account Manager	5	1.33	50.66
Branch Head	12	3.20	53.86
Business Analyst	5	1.33	55.20
Business Development Manager	18	4.80	60.00
Customer Relationship Manager	22	5.87	65.86
Customer Care-Head	5	1.33	67.20
Department Head	15	4.00	71.20
Front line Manager	11	2.93	74.13
Lead Manager	8	2.13	76.26
Operation Manager	10	2.67	78.93
Project Leader	16	4.27	83.20
Team Leader	12	3.20	86.40
Procurement Head	2	0.53	86.93
IT Head	8	2.13	89.06
Network Administrator	5	1.33	90.40
Section Head	4	1.07	91.46
Others (Did not report designation)	32	8.53	100.00
Organisation Type			
Local	0	0	0
National	207	55.2	55.2
International	168	44.8	100.00
No. of Employees			
Between 1 and 50	100	26.7	26.7
Between 51 and 100	38	10.1	36.8
Between 101 and 200	35	9.3	46.1
Between 201 and 500	50	13.3	59.5
Between 501-1000	18	4.8	64.3
More than 1000	134	35.7	100.0
Type of Industry			
Aviation	4	1.1	1.1
Banking/Financial & Insurance	59	15.7	16.8
Communications	14	3.7	20.5

Education & Research	34	9.1	29.6
Entertainment	8	2.1	31.7
Health, Wellness, SPA, Medical Tourism	15	4.0	35.7
Hospitality	18	4.8	40.5
Housing & Infrastructure	6	1.6	42.1
IT	75	20.0	62.1
ITES	9	2.4	64.5
Media	8	2.1	66.7
Office administration	13	3.5	70.1
Public relations	8	2.1	72.3
Real Estate & Construction	10	2.7	74.9
Retail	4	1.1	76.0
Transportation	5	1.3	77.3
Travel & Tourism	7	1.9	79.2
Others	78	20.8	100.0

Table 2 : Factor Loadings, reliability and validity indices for the measurement model

Measurement Items	Construct	Factor Loadings	Cronbach's Alpha	CR	AVE	T Stats	P Values
PCS1	*Perceived customer satisfaction*	0.917	0.905	0.941	0.841	69.01	0
PCS2		0.928				103.792	0
PCS3		0.906				73.366	0
PTP1	*Perceived task productivity*	0.935	0.912	0.945	0.851	105.103	0
PTP2		0.924				95.762	0
PTP3		0.909				69.242	0
PTI1	*Perceived task innovation*	0.901	0.893	0.933	0.824	58.741	0
PTI2		0.919				78.585	0
PTI3		0.903				68.176	0
PMC1	*Perceived management control*	0.931	0.924	0.952	0.868	90.634	0
PMC2		0.919				90.248	0
PMC3		0.945				110.318	0
PIOP1	*Perceived organisational performance*	0.867	0.941	0.953	0.773	49.88	0
PIOP2		0.859				44.364	0
PIOP3		0.876				52.424	0
PIOP4		0.894				58.719	0
PIOP5		0.894				66.87	0
PIOP6		0.883				59.283	0

Table 3 Fornell–Larcker criterion for discriminant validity

Independent Variables	PCS	PMC	PTI	PTP	POP
Perceived customer satisfaction	**0.917**				
Perceived management control	0.877	**0.931**			
Perceived task innovation	0.834	0.828	**0.908**		
Perceived task productivity	0.822	0.837	0.812	**0.923**	
Perceived organisational performance	0.688	0.701	0.679	0.681	**0.879**

Table 4: Path coefficients and t-statistics

Construct/Variables	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
PCS-> POP	0.158	0.165	0.089	1.782	0.075**
PMC->POP	0.243	0.239	0.087	2.785	0.006
PTI -> POP	0.187	0.19	0.079	2.374	0.018
PTP-> POP	0.196	0.189	0.089	2.207	0.028

****Significant at 10%**

Note: Perceived Organisational Performance- POP; Perceived Customer Satisfaction -PCS; Perceived Management Control -PMC; Perceived Task Innovation-PTI; Perceived Task Productivity-PTP

Figure1- Research Model

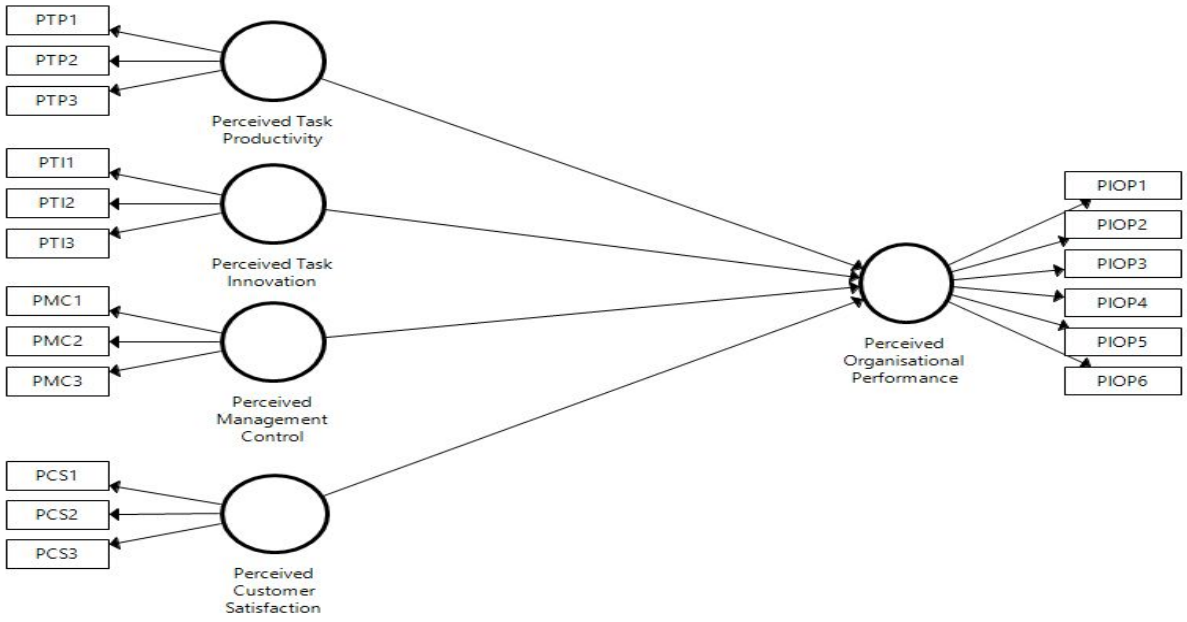

Figure 2: Measurement Model

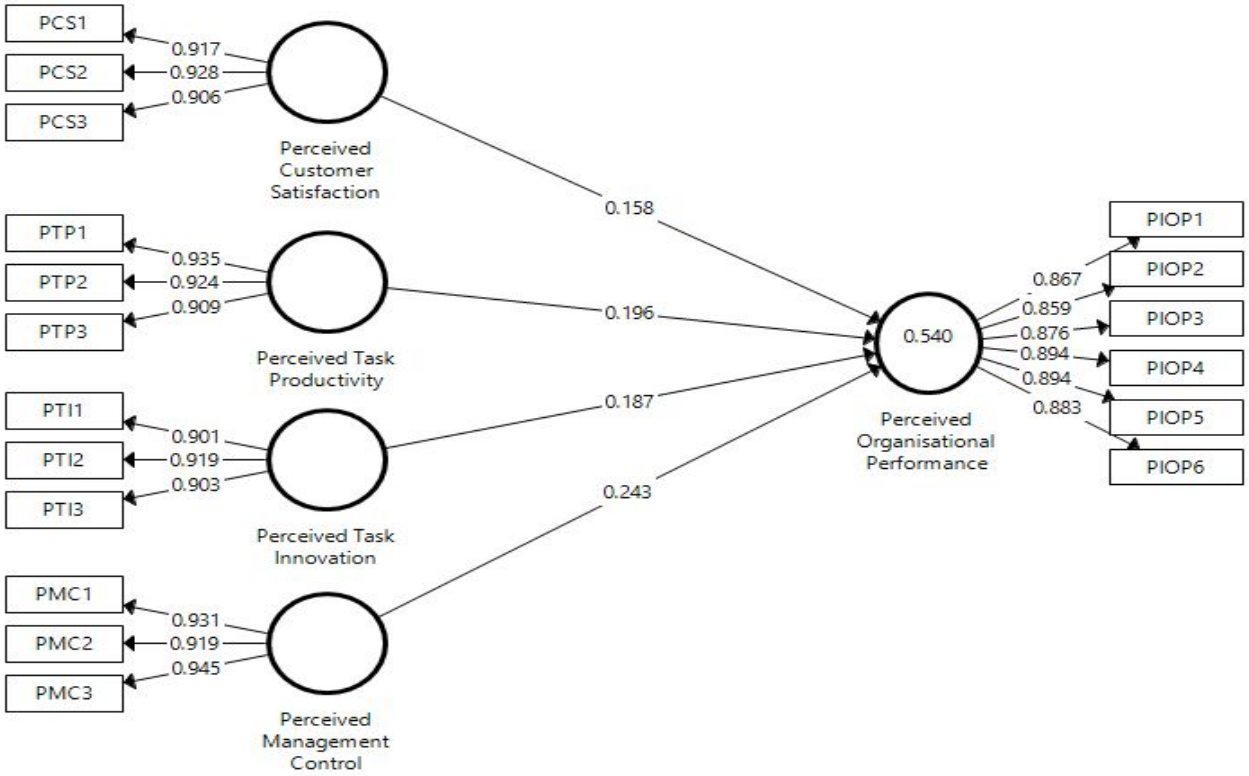

Figure 3: Structural Model