

Dynamics of Contextual Factors, Technology Paradox, and Job Performance in Smartphone Usage: A Systematic Review

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ABSTRACT

The purpose of this paper is to explore the theories pertaining to the dynamics of contextual factors, technology paradox, and job performance of employees so as to answer specific questions related to the theories' progressive advancement and to evaluate the relationships among them in the context of mobile phones using the evidence-based systematic review methodology. The term technology paradox has evolved over past decades, and theories have been postulated to explain its nature and relationships with its antecedents and outcomes; however, there is a dearth in the integrative models. Thus, the theory of paradox has been combined with other theoretical lenses to conceptualize tensions and responses to enrich extant theories on technology paradox and job performance. The finding of the study identifies seven research gaps in the available literature, which need to be plugged so that a holistic model is developed to address the interrelationships among the aforementioned research constructs.

KEYWORDS

Contextual Factors, Job Performance, Smartphones, Systematic Literature Review, Technology Acceptance Model, Technology Paradox, Theory of Reasoned Action

INTRODUCTION

Technology paradox has been an active area of research since the past decade, but its relationship with the performance of employees in the workplace is relatively underexplored. The word technology in the technology paradox refers to various technologies used in service and manufacturing industries in general, but the focus of this research is information and communication technologies (ICTs), mainly smartphones in the workplace, and their relationship with employees' *job performance*. A paradox is a widely spread phenomenon in organizations (Lewis & Smith, 2014). In the context of technology, a paradox manifests when technology users recognize the opposing outcomes of technology use due to the conflict between their initial expectations of how technology is supposed to function and the actual performance of technology (Mazmanian, Orlikowski, & Yates, 2013; Mick & Fournier, 1998). Contemporary workplaces are characterized by uncertainty and unpredictability that impact employees working within such ambiguous business environments (Cullen, Edwards, Casper, & Gue, 2014), and technology, as a context, can act as a driving factor to the emergence of

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a technology paradox, which further provokes tensions and internal conflicts in employees that need to be addressed by workers as well as their organizations (Bruzzi & Joia, 2015; Clegg, Cunha, & Cunha, 2002). Therefore, technology as a context makes latent tensions more salient, thereby enabling researchers to easily identify them (Jarzabkowski, Lê, & Van de Ven, 2013). However, traditional rational technology acceptance theories are insufficient for explaining the intuitive and automatic behavior of employees using smartphones for work-related purposes (Buettner, 2015), and there is a need for a thorough review of the underpinning theories in this area.

BACKGROUND

The notion of technology paradox has received attention in the literature from the work of Mick and Fournier (1998), who had undertaken the pioneering work specifically in the consumer's perspective and provided the basic model of technology paradox. Based on this model, Jarvenpaa and Lang (2005) identified eight technology paradoxes through semi-structured interviews; however, there were ambiguities between the dimensions that were to be clarified through further investigation. Ter Hoeven, van Zoonen, and Fonner (2016) studied the practical paradox of technology in communication technology use for work, which enables spatial and temporal flexibility, and found that communication technology use increases well-being through accessibility and efficiency, while at the same time, decreasing well-being through interruptions and unpredictability. This research relied on cross-sectional data, so causation was not possible. Ratna and Kaur (2016) studied the impact of technology on job-related aspects and found that newer technologies had an impact on the performance of employees, but this research was based on convenience sampling, and its generalization remained questionable. Van Zoonen and Rice (2017) examined the paradoxical implications of personal social media use for work on employees' autonomy and work pressure and how those relationships are moderated by employees' sense of responsiveness to colleagues' social media use. The study concluded that employees were more likely to be stressed by the use of personal social media than to benefit from it. Therefore, there is a scope to extend this study using mobile applications of social media platforms, which differ in features and functionalities, as they provide more autonomy from a location-based computer and increase employees' responsiveness (Mazmanian et al., 2013). Schlachter, McDowall, Cropley, and Inceoglu (2018) focused on the *empowerment-enslavement paradox* in particular and found that it was the non-manual performance of employees that was affected by the technology paradox. In the backdrop of these studies, various theoretical models are discussed to answer the research questions that originated through the literature review.

THEORIES OF TECHNOLOGY AND JOB PERFORMANCE

Several theories have evolved over a period of time that deal with the dynamics of the technology paradox and job performance in the business environment. While this paper specifically focuses on mobile technology, these theories are generic and applicable to all forms of ICTs that are usable in the business environment. Further, in the research literature, contextual factors that act as the antecedents (Jarvenpaa & Lang, 2005) and the technology paradox are dealt with concurrently as the technology paradox.

The theory of paradox is the basic theory that introduces the very concept of a paradox, according to which a paradox is "contradictory yet interrelated elements that exist simultaneously and persist over time" (Smith & Lewis, 2011, p. 382). This definition emphasizes two fundamental elements: *contradiction*, which highlights conflicts between two distinct elements, and interdependence, which describes the co-existence, synergy, and interwoven nature of these contradictory elements (Andriopoulos & Gotsi, 2017). Furthermore, the word *paradox* triggers a context-based meaning (Lewis, 2000), and some contexts are more likely to produce tensions than others (Jarzabkowski et al., 2013). In the context of technology, technology paradoxes manifest in a state, undertaking,

or behavior that has inconsistent or contradictory qualities that are interdependent and co-occur to generate technology paradoxes (Jarvenpaa & Lang, 2005) that are dynamic, constantly shifting between conflicting positive and negative aspects (Johnson, Bardhi, & Dunn, 2008) due to situational or contextual factors (Mick & Fournier, 1998). The literature on technology paradox proposes that contextual factors do have their impact in conflicting situations in the experience of technology users (Chae & Yeum, 2010; Jarvenpaa & Lang, 2005; Mick & Fournier, 1998).

The theory of reasoned action (TRA) is about the attitude forming an intention, which is responsible for a behavior (Fishbein & Ajzen, 1975; Hagger, 2019). From a paradoxical perspective, new ICTs can have ambiguous and contradictory consequences, as they may be redeeming and coercing at the same time (van Zoonen & Rice, 2017). Smartphone users usually experience ambiguous and ambivalent feelings or emotions that arise from perceived disagreements between expectations formed due to beliefs and the external reality (Johnson et al., 2008), which leads to experiencing a technology paradox. A paradox is perceptual in that it develops out of individuals' responses to contradictory situations that are usually constructed cognitively and socially as paradoxes (Lewis & Smith, 2014; Smith & Tushman, 2005) and can be influenced by national culture (Smith, Erez, Jarvenpaa, Lewis, & Tracey, 2017).

The theory underpinning the has widely been used, particularly in the context of mobile technology (Otieno, Liyala, Odongo, & Abeka, 2016). Davis, Bagozzi, and Warshaw (1989) considered perceived usefulness and perceived ease of use to be the two primary determinants that would cultivate attitudes toward mobile technology use, which in turn determined actual system use, the basis for the TAM. Critics of the TAM mainly argue that it completely ignores sociological and organizational aspects in addressing the adoption of newer technologies (Otieno et al., 2016). Maulani and Hamdani (2019), having considered the relevance of this model, applied it specifically to the study of mobile technology acceptance by the end-user and considered situational factors and past technology experience to be the dominant factors that comprise behavioral intentions for use.

The technology, organization, and environment (TOE) framework (Tornatzky, Fleischer & Chakrabarti, 1990) provides a basis for understanding how innovation becomes diffused in a society. The framework provides three distinct aspects that govern the process controlling the adoption of new technology—namely, technological context, organizational context, and environmental context. The TOE framework was adopted in the cloud computing environment, and it was observed that the three contexts referred to in the model exemplified new technology adoption (Micheni, 2015). The TOE framework has also provided empirical evidence for the relationships between its antecedents and technology adoption in the context of web services (Zhu & Kraemer, 2005). In another study, e-business value was studied using the TOE framework, which established a strong linkage between the three contextual factors with outcome achievement (Zhu, Kraemer, Xu, & Dedrick, 2004). Park, Kim, and Paik (2015) tested the TOE framework in Korean firms and observed that its compatibility with the actual system, data quality, integration, and privacy and security were rated highly in a technology context.

The task-technology-fit (TTF) theory also has bearings on technology paradox formation. The TTF theory was developed by Goodhue and Thompson (1995), who stated that TTF is a pivotal concept in assessing and explaining the success of information systems (ISs). This theory focuses on individuals' use of ISs and introduces a fundamental positivistic research approach that can be applied to ISs in general. According to the TTF theory, a good fit between task characteristics and technology characteristics is responsible for better performance and more optimal usage of the technology (Goodhue & Thompson, 1995). The TTF model is designed to investigate the actual usage of technology, particularly when it is new.

While the aforementioned theories address the technological aspects of paradoxes, some theories depend on the outcome of technology use in connection with performance in the workplace. The general perception is that the introduction of mobile technology in the workplace has increased employees' productivity, introduced more flexibility to work, and increased the efficiency of

coordination among people (Jarvenpaa & Lang 2005). However, ICTs in the form of smartphones introduce interruptions, data clutter, network problems, increased work pressure, and work-life imbalance (Fonner & Roloff, 2010; Leonardi, Treem, & Jackson, 2010; Mazmanian et al., 2013; Ter Hoeven et al., 2016; van Zoonen & Rice, 2017). Smartphones feature multiple-use contexts and have changed the way technology is experienced by users (Middleton, Scheepers, & Tuunainen, 2014). The ambiguities and inconsistencies that emerge from such technology can provoke internal conflicts or tensions among employees (Bruzzi & Joia, 2015; Clegg et al., 2002). Repeated confrontation with the paradoxical aspects of technology sooner or later affects users' usage experience in general and their productivity and job performance in particular (Chae & Yeum, 2010; Jarvenpaa & Lang, 2005).

Job performance is a set of traits, behavior, and characteristics of the output of jobs undertaken by employees that contribute to organizational objectives. There are many different approaches to theories of job performance. According to the personality theory of job performance, the personality of an employee is a major determinant of performance (Barrick & Mount, 1991), and five distinct dimensions of personalities have been identified in people—namely, *extraversion*, *neuroticism*, *agreeableness*, *conscientiousness*, and *openness*—each of which exhibits distinct traits in terms of action and behavior (Krausert, 2009).

Job experience theory (JET) is an advanced theory that postulates that people's job experience can help them handle unfamiliar situations better, thus enhancing their job performance (Schmidt & Hunter, 2004). The subjectivity involved in the influence of experience on job performance was the main reason for the limited validity of the JET (Hunter & Hunter, 1984). Testing the JET is more complex in comparison to other theories, as the experience of the employee does not necessarily need to be along the same lines as in the current job and may differ in terms of tasks handled, training undergone, responsibilities discharged, and so on. The major limitation of JET is that its validation is only possible with entry-level jobs, and when job performance must be evaluated for people with multiple job experiences, the theory does not do justice to the full range of their experiences (Krausert, 2009).

RESEARCH METHOD

Fundamentally, there are four types of methods used in literature review: *evaluative*, *exploratory*, *instrumental*, and *systematic* (Creswell & Clark, 2017). This research adopted a *systematic approach* to reviewing literature mainly to help build a hypothesis for a future course of action, which can then be subjected to an empirical investigation. Moreover, a systematic review *identifies*, *appraises*, *selects*, and *synthesizes* evidence relevant to the research questions (Bolderston, 2008). Research originates with the identification of an area where there is a need to conduct further research due to the lack of earlier research (Ahmad & Omar, 2016). The salient features of a *systematic review* are as follows: *it can be replicated*, *the approach is scientific*, and *the process adopted is transparent* (Khan, Kunz, Kleijnen, & Antes, 2003). This method has been chosen over narrative research (Ferrari, 2015) because the systematic review should lead to clear research questions to be addressed and locate all published literature in databases; furthermore, it is necessary to identify what type of studies have to be included, to examine the methods used in these studies, and to identify methodologically sound and unsound studies. The five steps through which this systematic research process has been carried out are as follows.

Defining Research Questions

The first step in any research is to formulate the research problem. To obtain a comprehensive understanding of the models related to the technology paradox and job performance, two questions need to be addressed.

Research Question 1: What is the current state of research regarding the models and theories about the dynamics of contextual factors, technology paradox, and employees' job performance?

Under this research question, two sets of models are reviewed: the first being *contextual factors* and *technology paradox* and the second linking *technology paradox* to *job performance*. The first two research constructs are treated as one because the research on contextual factors is multidimensional, and the focus here is only on the technology paradox.

Research Question 2: What are the focal themes of the research studies, and is there a gap in linking the three research constructs in an organizational context?

Selecting Keywords and Search Strategy

To find relevant research, the choice of the sources (e.g., reference databases, journals, or electronic databases) and the identification of the terms used to conduct searches are important (Cooper, 2017). Research started with the keywords “technology paradox,” “paradoxes of technology,” and “technology paradox and performance.” The journals that had publications on the technology paradox included Emerald Insight, EBSCO Host, Google Scholar, JSTOR, Wiley Online, Springer link, SAGE Journal, Inder-Science, Science Direct, Taylor and Francis, and Elsevier. During the search, the scope of the search was limited to digital libraries. In terms of the period of the publication, the articles selected for systematic review ranged from January 1990 to December 2019. The reason for starting from 1990 was that active research on technology paradoxes grew in prominence during this period. The first paper was by McQuarrie and Iwamoto, published in 1990 in *Social Science Computer Review* (SAGE Journals), and the last paper, by Bissonnette and Arcand, was published in 2018 in *the Journal of Entrepreneurship in the Arts* (EBSCOhost).

The search string was then modified to suit the requirements of each individual journal during the search process. The keywords and search strings can be found in Table 1.

The research at hand focused on the technology paradox, with specific reference to smartphones and job performance. However, there were few studies on this particular technology, and research on *paradox*, *technology paradox*, *productivity paradox*, and *information systems paradox* was previously undertaken by various researchers. Similarly, performance research also referred to the terms productivity and efficiency, which mainly referred to employee job performance. All these were considered, as they addressed the dimensions of paradox and job performance in different contexts that were relevant to the conceptual model development of this research.

Assessing the Quality of Primary Studies

Search strings were entered into the 37 databases, and a total of 549 articles were downloaded, out of which—after the titles and abstracts were read and considered based on relevance—it was found that only 395 were relevant in the context of technology paradox, performance, or both; 154 of the articles were eliminated. Among the 395 studies selected for inclusion, there were similar studies that would not add value to the research under consideration; thus, 135 studies were screened out, and 260 studies passed the criteria for inclusion and exclusion. After applying the inclusion criteria, 89 articles were excluded, and 171 studies qualified for quality assessment. Based on the quality of the papers, 81 papers were further rejected, and finally, 90 papers were considered fit for review based on the inclusion and exclusion criteria discussed in the next section (Figure 1). An overview of the search results is given in Table 2.

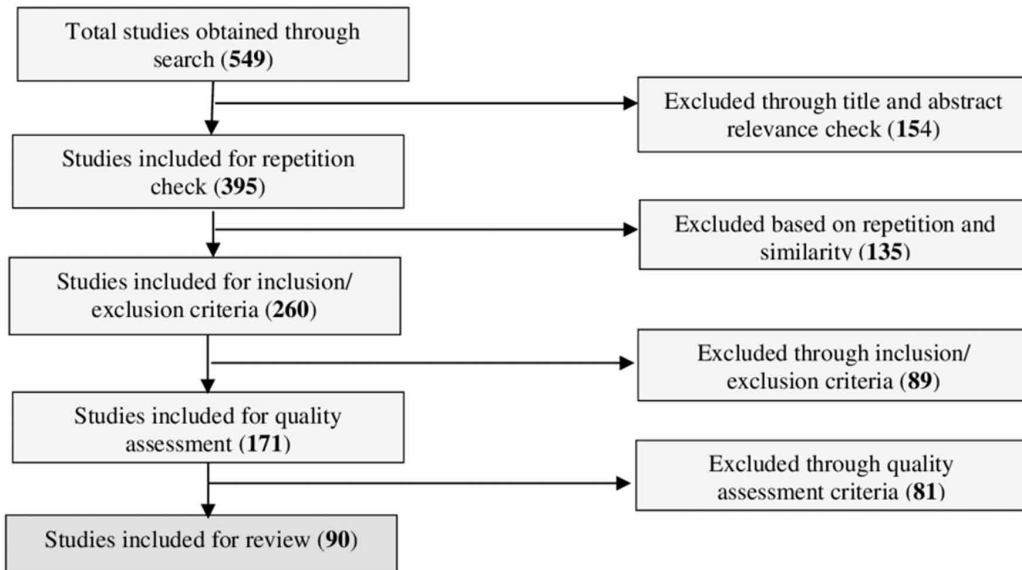
Inclusion Criteria

This section delineates the characteristics of studies that qualified articles for inclusion in the study—mainly the setting of the study, participants in the research, outcome characteristics, and so

Table 1. Search strings and Boolean operators

Concept	Keywords and strings	Boolean operator
Technology paradox theory	[Technology AND Paradox] [Theory OR Theories OR Model OR Models OR System OR Systems OR Concept OR Concepts]	AND
Paradoxes of technology theory	Paradoxes AND Technology [Theory OR Theories OR Model OR Models OR System OR Systems OR Concept OR Concepts]	AND
Technology and job performance theory	Technology AND Job performance [Theory OR Theories OR Model OR Models OR System OR Systems OR Concept OR Concepts]	AND

Figure 1. The selection process for review, adapted from Moher, Liberati, Tetzlaff, Altman, & PRISMA Group (2009)



forth (Cooper, 2017). The type of research relevant and providing answers to the research questions had to explicitly address the two research constructs—technology paradox and job performance of employees—either individually or collectively. Each article also had to lead to the development of the framework, model, or underlying theories; had to be exploratory in addressing the factors that constitute technology paradox or that make employees perform in an organizational setup; and had to establish linkages between the dimensions of the technology paradox and job performance or explain the ability of the models in building the theory behind paradox formation due to the usage of technology. Additionally, studies included needed to explain the models’ ability to contribute to theories behind job performance in an organizational setting, give alternate definitions and terminologies to the dimensions of the abovementioned research constructs, provide criticism of the theories under consideration, and record the empirical evidence for the existence of relationships

Table 2. Overview of search results

	Papers retrieved	Papers included	Contextual factors and Technology Paradox (CTP)	Job performance (JP)	CTP & JP
1. Academy of Management	14	4	1	1	2
2. American Psychological Association	28	9	1	6	2
3. Association of Information Systems	12	1	0	1	0
4. ASU Library	22	1	1	0	0
5. Cabell's Directory of Publishing Opportunities in Psychology	16	1	0	1	0
6. Central Archives – University of Reading	13	2	0	1	1
7. Claremont	7	1	0	0	1
8. Directory of Open Access Journals	8	2	1	1	0
9. EBSCO	14	3	0	2	1
10. Elsevier	6	0	0	0	0
11. Emerald Insight	31	2	0	2	0
12. ERIC	21	2	1	1	0
13. Ezine articles	6	2	1	1	0
14. Frontiers	4	1	0	0	1
15. German National Serials Database	3	1	0	1	0
16. Google Scholar	6	0	0	0	0
17. Harvard Business Press	16	1	1	0	0
18. Horizon Research	8	1	1	0	0
19. Ideas	4	1	0	0	1
20. InderScience	18	1	1	0	0
21. Index Copernicus	17	1	0	1	0
22. Information Systems & Organizations	10	1	0	0	1
23. INFORMS pubs online	6	3	2	0	1
24. Ingenta Connect	6	1	0	0	1
25. JSTOR	18	3	1	1	1
26. Omnia Science	7	1	0	1	0
27. Open Access Research Database	18	1	0	1	0
28. Oxford Journals	21	1	1	0	0
29. Oxford University Press	16	3	1	2	0
30. ProQuest	17	1	0	1	0
31. Questia	8	1	0	0	1
32. SAGE	26	9	1	6	2
33. Science Direct	21	12	4	5	3
34. Springer	35	3	1	1	1
35. Taylor and Francis	27	5	4	1	0
36. Ulrich's Web Directory	8	1	0	1	0
37. Wiley Online Library	31	7	1	5	1
Total	549	90	25	44	21

between the dimensions of the two research constructs. Finally, articles selected for inclusion also explicitly specified the methodological limitations of the theories on the two research constructs.

Exclusion Criteria

This section focuses on the criteria selected for excluding research articles initially chosen in the review process. In particular, these consisted of studies that did not correspond with the research question, such as studies that mentioned a primary focus on either technology paradox or job performance in the abstract, but did not address the issue adequately; studies that addressed the technology paradox in contexts not related to work environments; studies that addressed technology paradox theory

building based on a productivity context; studies that focused on the theory of technology paradox with psychological influences, such as burnout; studies that addressed job performance theory building based on emotional and psychological aspects; or studies that were concerned with the influences of personality types on the development of the technology paradox. Finally, papers that were editorials, keynote addresses, tutorial summaries, books, technical reports, non-peer-reviewed articles, and similar ones with no definite journal publication record were also excluded.

Quality Assessment

One of the challenges in writing a review article involves the quality of the papers chosen for the study. While there are no standard definitions available for the quality of a review paper, the quality, to a considerable extent, may be context-based. As the present study is an *evidence-based systematic review*, only definitions of quality in connection to this method have been considered. Oxman (1994), in the context of medical research, emphasizes the importance of the *internal validity* of a study and states that the degree to which the research design has been successful in minimizing *bias* is the best estimate of the quality of a review. Mudavanhu (2017), in the context of educational research, states that the quality of a review paper is reflected in the choice of key sources, appropriate selection of the theories, quality of research questions, structure and organization of the content, accuracy of definition of the key terms, and extent to which the true knowledge available is understood. Again, in the context of the medical field, the quality of articles reviewed lies in their ability to build *methodical orientation* for future studies (Tran, Le, & Vo, 2017). Many articles have highlighted other criteria for quality research reviews; however, in the interest of this research, the following criteria have been adopted to ensure the quality of this review.

The studies selected for review were chosen from peer-reviewed journals, and some were indexed by standard indexing bodies, such as ISI Web of Science, SCOPUS, Emerging Source Citation Index (ESCI), EBSCO A-to-Z, and Index Copernicus, etc. Initially, attempts were made to restrict the articles to only the first two of the aforementioned indexing databases, as they are considered to be standard references. However, as the technology paradox is not a very widely researched area and not many papers were available in these two databases, quality-oriented papers from other peer-reviewed journals were also used in this review. The quality assessment of these papers has been based on the objectives of the research, their contribution to theory building, their methods used to eliminate bias, the robustness of their research design, the accuracy of key definitions, evidence provided for establishing the linkages between the variables of the study, and the references used.

Defining Data Extraction

Data extraction was manually undertaken through *characterization* and *classification*, as recommended by Tranfield, Denyer, and Smart (2003); thus, they were based on general characteristics of the studies and classification schemes. The characteristics of the studies have been tabulated in the form shown in Table 3.

Data Synthesis

In this stage of the research, the classification scheme was thoroughly analyzed, which is later described in a separate section.

Data Extraction

Data extraction was undertaken based on the results obtained in previous steps that involved characterization and classification, which involved the following systematic steps.

Table 3. Exclusion criteria and characteristics form

	Exclusion criteria	Characteristics and classification of the study
Type of publication	<input type="checkbox"/> Not peer-reviewed <input type="checkbox"/> Not Indexed	
Research philosophy	<input type="checkbox"/> Transformational	<input type="checkbox"/> Constructivist <input type="checkbox"/> Positivist <input type="checkbox"/> Interpretivist <input type="checkbox"/> Pragmatic
Research design	<input type="checkbox"/> Case Report <input type="checkbox"/> Conceptual paper	<input type="checkbox"/> Observational <input type="checkbox"/> Retrospective <input type="checkbox"/> Intervention <input type="checkbox"/> Prospective <input type="checkbox"/> Cross-sectional
Source of data	<input type="checkbox"/> Hypothetical <input type="checkbox"/> Simulation	<input type="checkbox"/> Interviews <input type="checkbox"/> Surveys <input type="checkbox"/> Content analysis <input type="checkbox"/> Observation
Sampling frame		<input type="checkbox"/> Educational database <input type="checkbox"/> Corporate database <input type="checkbox"/> Municipality <input type="checkbox"/> Any other finite population
Characteristics of respondents		<input type="checkbox"/> Gender <input type="checkbox"/> Age <input type="checkbox"/> Educational qualifications <input type="checkbox"/> Marital status <input type="checkbox"/> Employment status <input type="checkbox"/> Work experience <input type="checkbox"/> Any other demographic variable
Outcome measures and results	<input type="checkbox"/> Non-generalizable	<input type="checkbox"/> Generalization <input type="checkbox"/> Theory building <input type="checkbox"/> Framework development <input type="checkbox"/> Empirical evidence <input type="checkbox"/> Work experience <input type="checkbox"/> Interpretation
	None of the exclusion criteria fulfilled	→ Study included
	One or more of the exclusion criteria fulfilled	→ Study excluded

General Characteristics of Included Studies

The general characteristics of included studies were matched to the providing of answers to the research questions. The analysis was performed for publication trends, distribution of studies by databases, research methods used, and the journals in which they were mostly published.

Classification Scheme

The classification schemes relevant to this research are *contribution*, *focus*, and *type* of research, which are further discussed in the following sections.

Contribution Type

The terms *technology paradox* and *paradoxes of technology* have been used interchangeably in the research literature. Thus, the following four classifications were made in this research:

1. Theories of paradox of technology
2. Theory of technology acceptance
3. Theories of job performance
4. Theories of paradox of technology and job performance

Research Focus

In the research under consideration, the following were important considerations in relation to the research focus of each of the studies.

1. *Model development*: These studies were primarily exploratory in nature, making attempts to develop a model to relate the research constructs of interest.
2. *Model testing*: These studies attempted to test the models that existed in specific areas of study.
3. *Model adaptation*: These studies were related to issues of adoption of the model in a given context.
4. *Model advancement*: These studies were related to the growth of the relevant studies over a period of time.

Research Type

The analysis resulted in the identification of seven different research types that were dominant in the research literature. The classification of these research types is presented in Table 4.

Data Synthesis

General Characteristics

As mentioned earlier, general characteristics were specific to the research questions of this research. Various types of research undertaken on the research constructs under consideration were identified. The articles involved different types of research, as displayed in Table 4. In terms of the distribution of papers based on the research constructs under review, out of the 90 papers that were examined, the greatest number of papers addressed *job performance* (44), followed by *contextual factors and technology paradox* (25); the remaining papers studied a combination of both research constructs (21). In examining the publication trends in the databases selected for this literature review, the greatest number of articles came from Science Direct (12), followed by the American Psychological Association and SAGE (9 each), and Wiley Online Library (7; Figure 2). None of the articles found in Google Scholar could be used in this research, as they were eliminated based on the quality assessment criteria applied to this research. In terms of the year of publication, the papers were categorized in terms of decades of publication, and it was found that the greatest number of publications relevant to this research was found in the year 2010 to 2015 (23), closely followed by 2015 to 2019 (18), and 2000 to 2005 (17), which indicates that research on the influence of the technology paradox on job performance of employees has been gaining popularity in recent years (Figure 3).

The variation in the number of articles published—in particular, the declining trend in the period 2005–2010, and then, a sudden increase in the next five years—may be attributed to several reasons. Initially, when smartphones were introduced and captured the markets, their usage during working hours was considered a hindrance to work, and the usage was discouraged. Several researchers even published articles on the psychological issues behind mobile phone usage and its repercussions for work-life balance (Bianchi & Phillips, 2005); the focus was more on the cultural and economic aspects of mobile phone usage, either working on-site or outside (Wei & Kolko, 2005). Furthermore, mobile

Table 4. Classification of research studies and the description

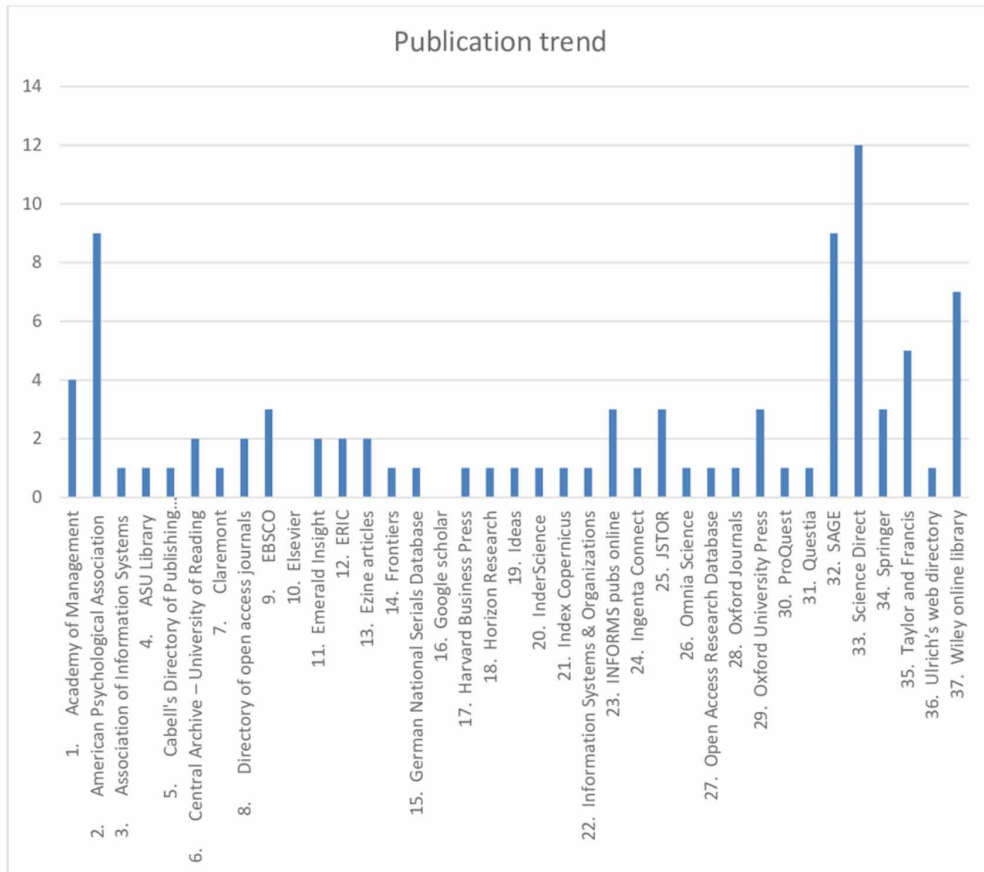
Type of Research	Description
1. Analytical	Involves a critical evaluation of the available material by an in-depth study to explain a complex phenomenon.
2. Empirical	Tests models or frameworks to provide empirical proof.
3. Viewpoint	Involves the author's interpretation of a situation, phenomenon, model, etc.
4. Conceptual	Makes use of discursive and philosophical discussions leading toward the building of hypotheses.
5. Case study	Describes actual interventions or experiences and can be subjective to a considerable extent.
6. Comparative study	Illustrates convergence and divergence between various research projects on the same topic.

capabilities were low in 2005, as smartphones were just becoming popular. For instance, iPhone usage was about 1 million in the year 2005, grew to about 40 million in 2010, but suddenly increased to nearly 230 million by 2015 and exponentially increased thereafter (Smartphone Addiction, 2020). Users are more likely to experience the paradoxical effects of mobile phones with new releases (Jarvenpaa & Lang, 2005). Thus, issues of mobile phone usage in the workplace were not a very sought-after area of research during the period of 2005 to 2010. However, as mobile phone usage suddenly increased during the period 2010 to 2015, there appeared to be more focused research on mobile phone usage in the workplace. The year 2015 may be considered the saturation point, after which there was again a slight decrease, but it can be noted that this decrease was not as significant as in the years 2005 to 2010. However, there was one article published in 1957 that was highly relevant to this research, as it had very focused research on the influence of technological changes on human behavior and was thus used in the literature review. The best databases for possible publication of research on the technology paradox and job performance were Science Direct, the American Psychological Association, SAGE, and the Wiley Online Library, as these sources included more studies recorded in relation to these research constructs. The papers reviewed may be classified into six groups, which are described in Table 4

Outcome of the Classification Scheme and Research Questions

The classification scheme of the literature reviewed in this research makes it imperative to distinguish between three major schemes of research in connection to the technology paradox: 1. theory building on technology paradox, 2. theory building on job performance, and 3. association between technology paradox and human behavior, affecting job performance. The first scheme focused on exploring the dimensions of the technology paradox and their antecedents, the second focused on exploring the dimensions of job performance, and the third focused on the influence of the technology paradox on human behavior, job performance, or both. The studies on human behavior were based on both individual well-being aspects as well as organizational aspects, such as *performance*, *efficiency*, and *productivity*. In terms of the research methods used in these studies, the majority of the studies were *qualitative* (85%), a few studies were *quantitative* (11%), and a small number were *mixed methods* based research (Figure 4). A mapping of the articles' contribution, research focus, and research type is depicted in Figure 5. While the diagram could be generated through software, the figure has been drawn manually to allow for greater customization. A total of 90 papers were reviewed, 25 of which addressed contextual factors and the technology paradox, 44 of which addressed job performance, and the remaining 21 of which addressed a combination of contextual factors and technology paradox and job performance. Among these 90 papers, 12 papers were analytical, four were empirical papers, 32

Figure 2. Journal-wise publication trend

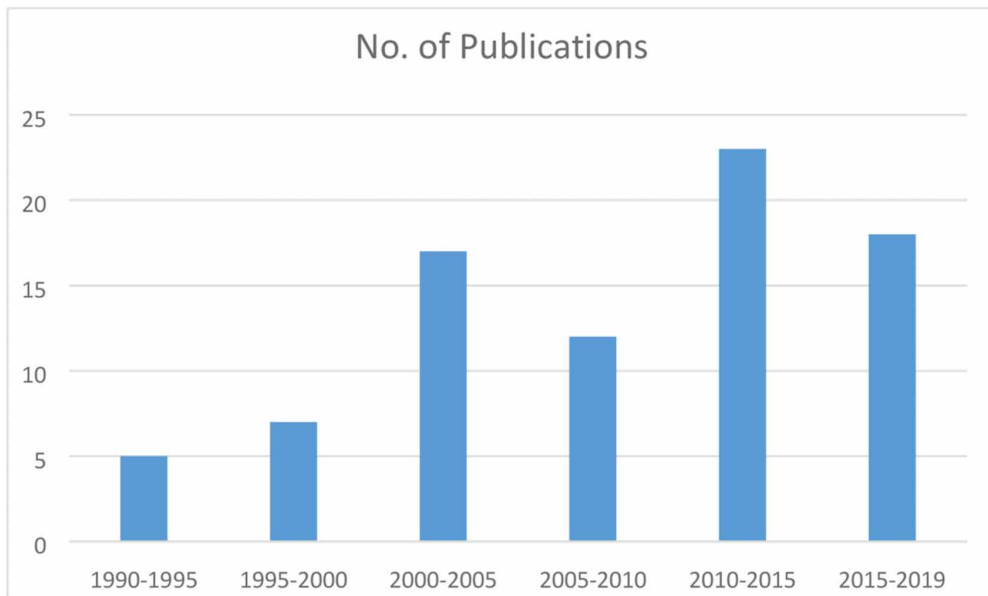


were viewpoint papers, 10 were conceptual papers, 29 were case studies, and seven were comparative studies. Furthermore, among the analytical papers, eight papers attempted *model development*, two involved *model adaptation* into a specific context, and the remaining two attempted *model advancement*. The four empirical papers focused on *model advancement*. Among the viewpoint papers, 15 papers involved *model testing*, 12 addressed *model adaptation*, and the remaining five attempted *model advancement*. Among the *conceptual papers*, three addressed *model development*, and seven concerned *model advancement*. Among the case study papers, 15 attempted *model advancement*, six involved *model development*, five concerned *model testing*, and three addressed *model adaptation*. Finally, among the comparative, study-based papers, four addressed *model development*, two conducted *model testing*, and one involved *model adaptation*. It can be observed that not a single paper specifically addressed the *mediating effect* of the technology paradox on the relationship between its contextual factors and employees' job performance. The following section is a discussion of the classification of research studies.

Model Development

Among the 30 papers that focused on model development, there was not a single paper relating contextual factors, the technology paradox, and job performance. However, separate studies have linked these three research constructs (e.g., Jarvenpaa & Lang, 2005; Mazmanian, 2013; Mick &

Figure 3. Year-wise publication trend



Fournier, 1998). The first paper that provided a comprehensive model of a technology paradox was by Mick and Fournier (1998). According to Mick and Fournier (1998), a paradox exists only if two contradictory things coexist; that is, “a paradox maintains that something is both X and not X at the same time” (p. 125). For instance, employees may feel free and empowered to use their mobile devices whenever they prefer, yet this perpetual connectivity also restricts their freedom to distance themselves from others (Jarvenpaa & Lang, 2005). Regardless of the place and time, they may always be connected to their work (Chae & Yeum, 2010). Thus, they simultaneously feel empowered and enslaved (Jarvenpaa & Lang, 2005). Furthermore, paradoxes are dynamic and inevitable. They tend to change and evolve (Lewis, 2000) or interact with each other due to situational or individual factors that evoke fluctuating feelings, vacillating between contrary feelings or opinions (Jarvenpaa & Lang, 2005; Mick & Fournier, 1998).

Despite the importance of how individuals respond to paradoxes, which shapes the impact of the type of paradox they encounter (Jarzabkowski et al., 2013), categorizing technological paradoxes remains the dominant thread addressed in the literature (Bruzzi & Joia, 2015). The focus of this research is on literature that provides results of ICT use in an organizational context and the paradox that technologies create in the minds of employees (Jarvenpaa & Lang, 2005; Leonardi et al., 2010; Mazmanian et al., 2013; Ter Hoeven et al., 2016; van Zoonen & Rice, 2017), except one study from the field of *consumer research and marketing* by Mick and Fournier (1998). Mick and Fournier (1998) mainly focused on consumers’ perspectives of technology paradoxes. Their focus was on awareness and coping strategies that consumers employ. They identified the most salient paradoxes as well as the ones that were tacit in the minds of technology consumers (Table 5).

Model Testing

There are relatively few papers (8) testing theories based on technology paradox or job performance; furthermore, research with empirical testing is rare. A study from Royal Court Affairs in Oman proved that employee motivation had a significant influence on job performance and that its impact

Figure 4. Distribution based on research method



was as high as 67% (Qatmeemalmarhoon, Mohdnoor, Abdalla, & Musbah, 2017). A study on IT Park software developers in Pakistan, with a sample size of 200 and a six-dimension scale of natural and extraneous motivation, indicated that all the dimensions of motivation had a significant influence on job performance (Ali, Bin, & Piang, 2016). In a study conducted at Kenya Commercial Bank, Mombasa, it was found that mutual trust, self-respect, and self-esteem acted as motivational factors that enhanced the job performance of the employees (Onanda, 2015). Bonsu and Kusi (2014) endorsed Herzberg's theory Y of motivation and, through a study of local government workers in Ghana, concluded that intrinsic factors provide better motivation to employees than extrinsic factors. It has been found that empowerment and recognition can be effective tools in motivating employees, which can, in turn, lead to better job performance (Dobre, 2013). There were also studies in which motivation had no significant influence on employee performance; however, remuneration had a positive impact on the job performance of the employee in the context of the employees at a food and beverage manufacturing company (e.g., Cahyanugroho, Hubeis & Wijayanto, 2016).

Model Adaptation

There were 27 papers identified in the area of model adaptation in connection to contextual factors, technology paradox, and job performance. There are several distinctive theories in these areas that have been discussed in earlier sections. The one that is specific to the technology paradox context is the theory proposed by Lai (2017), who comprehensively reviewed the concepts, applications, and development of technology adoption models and potential applications for the novelty of technology. The adoption of technology has been linked by the theory of reasoned action (TRA) (Fishbein & Ajzen, 1975), theory of planned behavior (TPB; Ajzen, 1985), decomposed theory of planned behavior (DTPB; Taylor & Todd, 1995), technology acceptance model (TAM; Davis, Bagozzi, & Warshaw, 1989), TAM2 (Venkatesh & Davis, 2000), and TAM3 (Venkatesh & Bala, 2008). Lai's (2017) paper provided a theoretical background, research problems, the parameters involved, and measurements in the context of technology adoption. However, much remains to be done, specifically in terms of the issues related to the behavioral aspects of the employees in the adoption of newer technology, which keeps changing at a pace that has never been seen before.

Figure 5. Research focus map

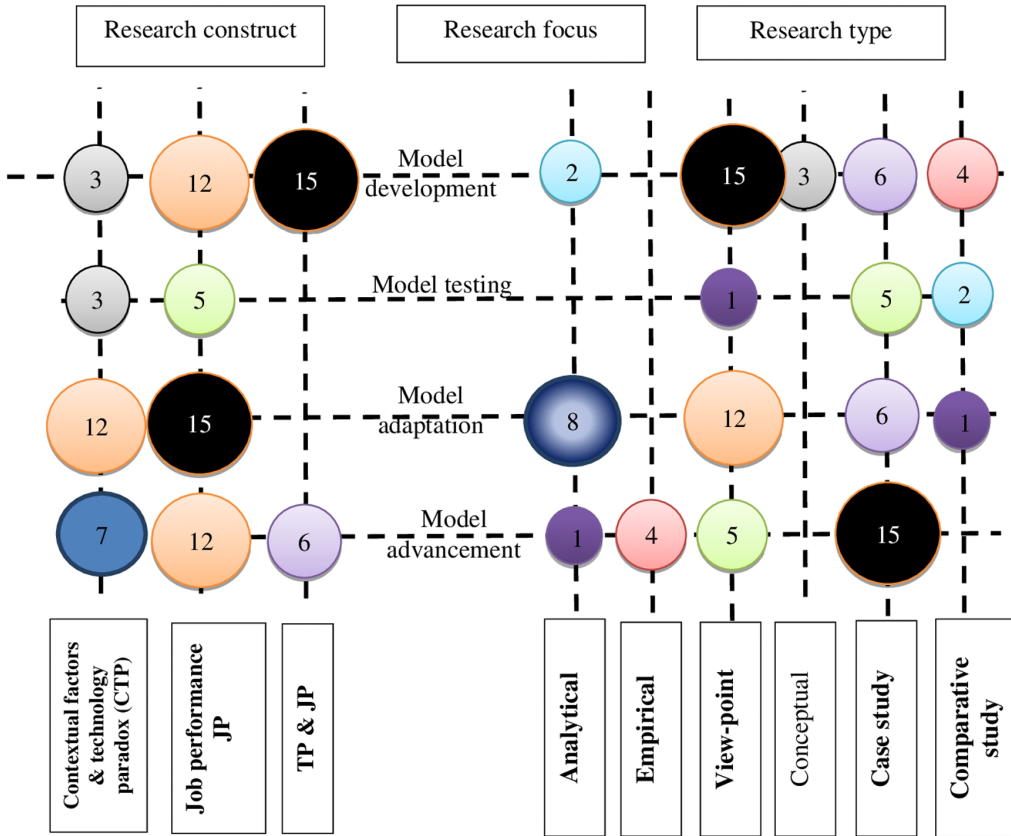


Table 5. Paradoxes of technology adapted from Mick and Fournier (1998)

Technology Paradox	Observation
Control-chaos	Technology has the potential to create order or chaos.
Freedom-enslavement	Technology can liberate as well as shackle.
New-obsolete	Technologies can emancipate knowledge as well as erode it.
Competence-incompetence	Technology can enhance intelligence or efficacy but can also lead to ignorance or ineffectiveness.
Efficiency-inefficiency	Technology can reduce resource consumption as well as increase it.
Fulfills-creates needs	Technology can meet needs or even lead to the creation of more.
Assimilation-isolation	Technology may aid human integration but may also lead to isolation.
Engaging-disengaging	Technology can network people or promote passivity.

Model Advancement

There have been 25 articles on model advancement in the context of technology paradox and job performance dynamics. There have been multiple attempts to advance models of contextual factors, technology paradox, and job performance. Even though there are several studies regarding the advancement of the technology paradox model developed by Mick and Fournier (1998), a noticeable contribution came from Chae and Yeum (2010), who not only tested the model but also began to explore reasoning for paradox formation. Chae and Yeum formulated hypotheses based on the model and tested them ($n = 172$). The independent variables in their research were paradoxes and propensity of the mobile technology paradox, and the dependent variable was coping strategies. Researchers have found that the majority of the participants were cognizant of the contradictory aspects of mobile technology. Furthermore, these contradictory aspects had a strong correlation between technology paradoxes and were considered to be responsible for reduced mobile consumption. Such findings substantiate the findings of earlier studies on the technology paradox, such as Mick and Fournier's (1998) study, which noted that paradoxes such as *empowerment-enslavement*, *efficiency-inefficiency*, and *new-obsolete* were among the salient paradoxes that emerged due to users' repeated confrontation with the contradictory attributes of technologies.

Furthermore, researchers found that mobile users' perceptions of *mobile technology paradoxes* are susceptible to changes, with the frequent use of such devices, when users become more experienced with mobile device usage. For example, changes in users' perceptions of *public-private* and *planning-improvisation* paradoxes were evident in their responses, as such paradoxes that were once in conflict were subsequently considered benefits. Furthermore, the improvisation that mobile devices allow for has contributed to better job performance by helping users to do their jobs efficiently. Similarly, the *public-private paradox* that manifested in previous studies as a mobile technology paradox—that is, an issue recognized by mobile users—was found to be less important and less likely to cause a conflict in mobile users' experiences (Chae & Yeum, 2010). Thus, such findings in Chae and Yeum's (2010) study contradict earlier findings by Jarvenpaa and Lang (2005), who viewed the abovementioned paradoxes as “conflicting situations” that generate tension and need to be mitigated through coping strategies. However, the changes in perceptions of the paradoxes align with the previous studies by Mick and Fournier (1998) and Smith and Lewis (2011), who noted that paradoxes are dynamic, as they tend to evolve, change, and fade in and out people's lives. The dynamic nature of a paradox explains why users' perception of existing technology paradoxes in the literature is likely to change, and as a result, those paradoxes need to be verified in newer contexts.

DISCUSSION

This literature review has been conducted to specifically address the two research questions. While the first research question concerned the underpinning theoretical models of the research constructs, the second was related to the identification of a research gap.

The foundational model to the research on technology paradox originates from Mick and Fournier (1998), which has yielded eight technology paradoxes; however, ambiguity among the dimensions was an issue that needed to be addressed. Arnold (2003) adopted a metaphorical approach to the technology paradox that proved that the use of metaphor could enhance technology performance. Even though this study was purely qualitative, it resulted in the identification of 22 factors linked to the affordances of technology. The second breakthrough in the research on the technology paradox was provided by Jarvenpaa and Lang (2005), who eliminated the issue of ambiguity in the dimensions of the technology paradox in the context of mobile technology. Even though this research was a significant contribution to the research on technology paradoxes, as it considered the effect of situational factors, the study lacked empirical evidence to support linkages between the identified dimensions. Middleton (2007) countered some of the dimensions and further fine-tuned the dimensions of the technology paradox. Johnson et al. (2008) added theoretical and managerial implications to the technology paradox, identifying the overlap between some of the dimensions and

further fine-tuning the dimensions of the technology paradox. Chae and Yeum (2010) exclusively explored the managerial component of the technology paradox and provided a technical attribute-oriented or managerial attribute-oriented perspective to the research on the technology paradox. Fonner and Roloff (2010) initiated a well-documented empirical investigation of the relationships between the dimensions of the technology paradox and work-life balance. Barley, Meyerson, and Grodal (2011) provided the social and cultural dimensions to the issue of the technology paradox. Zhuang, Hsu, Brewer, and Xiao (2012) established linkages between the technology paradox and customer loyalty. Borges and Joia (2014) observed gender differences in perceptions of the technology paradox. Cavazotte, Lemos, and Villadsen (2014) disproved the autonomy paradox, with specific reference to smartphones. Ter Hoeven et al. (2016) linked the technology paradox to the well-being of employees, as it had a bearing on their job performance. Ratna and Kaur (2016) associated the technology paradox with the employees' job performance. Van Zoonen and Rice (2017) linked the contradictory effect of the personal social media paradox for work on employees' autonomy and work pressure. While these are prominent research breakthroughs in technology paradox research, there have been many other studies not directly related to the dynamics of contextual factors, technology paradox, and job performance, which are the primary focus of this research. While these discussions address the first research question posed, the next issue is the seven research gaps, which have been listed in Table 6.

CONCLUSION

This literature review indicates that researchers have utilized *qualitative* and *quantitative* research methods to study the technology paradox; however, few studies have adopted a *mixed-methods* approach. There is evidence for *qualitative* studies based on the grounded theory approach. In those *qualitative* studies, data collection has taken place through a combination of techniques that included interviews, discussions, semi-structured in-depth interviews, and questionnaires. Some researchers have used thematic analysis and identified patterns based on the response of the participants in the survey.

There have been different threads of research on technology paradox that include technology consumers' perspectives, the performance of technology, mobile users' perspectives, work-life conflict, satisfaction with technologies, coping strategies, a comparison between teleworkers and office workers, technology-enabled communication, social networking, gender role, flexible workflow design, etc. Most of these studies have attempted to understand the technology paradox better and have either provided evidence for respondents' agreement or disagreement with the paradox. Researchers have also studied the mediating influences of factors associated with technology paradoxes to gain insight into the impact they can have on the respondents. Through the research gap identified in this paper, it can be concluded that there is a necessity to conduct empirical research to study the role of the technology paradoxes in mobile technology usage in business environments to explore their influence on the job performance of employees. The practical implication of this literature review is the identification of seven specific research gaps in the existing literature, opening up new directions for further research on each of these gaps. For instance, the first gap is on the contradictory evidence, and the resolution of conflicts in defining the identified paradoxes could facilitate the mitigation of the ill effects of these paradoxes, ultimately allowing employees to use mobile technology more effectively in the workplace. Similarly, the action-knowledge conflict type of gap is an avenue for future research to secure empirical proof for the existence of relationships between specific technology paradoxes, particularly in the context of mobile phone usage in the workplace, which could be very useful to human resources managers seeking to help employees make effective use of mobile technology. The theoretical implication of this systematic literature review is that it has linked the three major focal themes that have been studied discretely so far in the literature. In this era of smartphone usage in the work environment, the technology paradox and its role in job performance is an important research topic, and more research studies in this direction can be envisaged.

Table 6. Research gaps identified in the literature

Type of Gap	Sources
1. Contradictory Evidence	Mick and Fournier (1998) have identified eight technology paradoxes that were later refined by Jarvenpaa and Lang (2005), Middleton (2007), Fonner and Roloff (2010), Barley et al. (2011), Cavazotte et al. (2014), and Ter Hoeven et al. (2016) have countered these technology paradoxes in different contexts, including the use of ICTs in the form of mobile phones. Thus, these conflicting results fall under the <i>contradictory evidence</i> (Jacobs, 2011; Müller-Bloch & Kranz, 2015) category of research gap, a gap that needs to be filled.
2. Knowledge Void Gap	Research on the technology paradox (e.g., Fonner & Roloff, 2010; Middleton & Cukier, 2006) has shown that work intensification helps employees meet multiple demands of their jobs, thereby forming a negative correlation between information exchange frequency and work-life balance, resulting in better management of their lives. Similarly, unwitting enrollment in practices of work expansion intensified control of the employees (e.g., Cavazotte et al., 2014). Therefore, these studies need to be extended to other domains of employees' jobs and new contexts. Thus, all these can be categorized as <i>knowledge void gaps</i> (Jacobs, 2011) that must be filled.
3. Practical Knowledge Gap	Several studies qualitatively identified the technology paradoxes (e.g., Cavazotte et al., 2014; Mazmanian et al., 2013; Middleton, 2007). Additionally, theoretical models (e.g., Jarvenpaa & Lang, 2005; Mick & Fournier, 1998) that illustrate the role of the technology paradoxes have been developed, but there has been a lack of studies in practical situations that supports extant models in the literature. This constitutes the <i>action-knowledge conflict</i> or the <i>practical knowledge gap</i> (Müller-Bloch & Kranz, 2015) that needs to be filled.
4. Methodological Conflict	Most of the studies on the phenomenon of the technology paradox have been heavily reliant on <i>qualitative</i> approaches, whereas <i>quantitative</i> studies are scarce, as examining paradoxes challenges traditional quantitative methods (Schad, Lewis, Raisch, & Smith, 2016). Similarly, there are very few studies using a mixed-methods approach, but the studies' results do not accord with each other due to the influence of the methodology on the research results. Thus, a gap exists between the desired and current state of research that constitutes the type of research gap referred to as a <i>methodological conflict</i> (Jacobs, 2011). Thus, a variation in research methods is recommended, especially if the topic has been addressed using a common or a particular method (Müller-Bloch & Kranz, 2015), such as the qualitative method used to study the technology paradox.
5. Evaluation Void or Empirical Gap	There are studies examining the association between technology and consumer performance ambiguity (e.g., Johnson et al., 2008), studies on the technology paradox and coping strategies (e.g., Chae & Yeum, 2010; Jarvenpaa & Lang, 2005; Mick & Fournier, 1998), studies on technology usage and management of life (e.g., Cavazotte et al., 2014; Fonner & Roloff, 2010; Middleton, 2007), studies relating technology with social and cultural aspects (e.g., Barley et al., 2011), studies on paradoxes involving social networking sites and customer loyalty (e.g., Zhuang et al., 2012), studies on technology and gender role (e.g., Borges & Joia, 2014; Bruzzi & Joia, 2015), and studies on technology and flexible workflow design (e.g., Ter Hoeven et al., 2016), but there is a lack of evidence or of an empirical study on the relationship among contextual factors, technology paradoxes, and job performance of employees, which is vital to the organizational growth point of view. This constitutes an <i>evaluation void or empirical gap</i> (Müller-Bloch & Kranz, 2015) that needs to be filled.
6. Theory Application Void Gap	A <i>theory application void gap</i> (Jacobs, 2011; Müller-Bloch & Kranz, 2015) exists because the technology paradox phenomenon has been addressed using a common "qualitative" method, which resulted in the lack of theory application that would allow for the generation of new insights. Using the theory of paradox to enrich extant technology and job performance theories can help researchers understand how the associated theories provide newer perspectives to behavioral influences on performance, as well as the nature of handling of tensions, which, in turn, can provide more theoretical insights as well as managerial prescriptions (Lewis & Smith, 2014).
7. Population Group or Under-researched Sub-Groups Gap	Few scholars have studied the role of age (e.g., Mick & Fournier, 1998) and gender (e.g., Borges & Joia, 2014; Bruzzi & Joia, 2015) in the technology paradox. The impact of gender in accentuating paradoxes due to smartphone use is relatively new in the field of IS (Borges & Joia, 2014). Specific individual factors, such as gender and age, have a role in how one perceives and recognizes a technology paradox. Thus, the association between demographics and the technology paradox is under-researched. Furthermore, prevalent studies on the technology paradox have been limited to the context of western countries; therefore, the outcomes of the studies undertaken in western societies (individualistic), particularly on individual characteristics, cannot be generalized into more collectivist societies. One's behavior is influenced by the culture of society, which, in turn, has a bearing on organizational culture and job performance (Paschal & Nizam, 2016). For that reason, it is imperative to study such paradoxical tensions in a new context, as the cognitive frames imposed by national culture inform individuals' cognition when facing tensions (Smith et al., 2017). Therefore, there is a <i>population group or under-researched sub-groups gap</i> (Robinson, Saldanha, & Mckoy, 2011) to be filled.

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