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A Meta-Analytical Review of Antecedents of Organizational Ambidexterity

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ABSTRACT

The aim of the study is to conduct a structured review of literature on the antecedents of organizational ambidexterity by reconciling the mixed outcomes produced by the extant literature. This study offers some theoretical insights into the divergent views of authors on these factors by analysing the empirical studies done in the literature. This paper systematically analyses the extant literature on the factors affecting organizations' ambidexterity, using meta-analysis and the theory, context, characteristics, and methodology (TCCM) framework. Forty-three research papers across various journals that discussed the correlation of the variables with organizational ambidexterity were selected. The sample size was 17,383, and 20 variables were selected for the analysis. The results revealed that two variables showed high levels of heterogeneity. The implications of this study are relevant to the present business scenario and of substantial interest to scholars, as they provide a more detailed understanding of the very foundation of organizational ambidexterity.

KEYWORDS

Antecedents of Ambidexterity, Exploitation, Exploration, Meta-Analysis, Organizational Ambidexterity, TCCM

1. INTRODUCTION

Organizational ambidexterity is a firm's capability to efficiently manage current business interests and requirements, while at the same time being flexible enough to adjust to dynamic shifts in the external environment (Duncan, 1976; Maclean *et al.*, 2020; Tushman and O'Reilly, 1996). Broadly, an organization can engage in divergent pursuits concurrently, such as exploitation and exploration, efficiency and flexibility, incremental and radical innovation, or alignment and adaptability (Mom *et al.*, 2015). While exploitation is incremental adjustments, improved efficiency and progress; exploration is closely linked to radical change, new possibilities and variety development (March, 1991; Suzuki, 2015). It is recognized that to be ambidextrous in its orientation, an organization should employ exploitation to maintain current viability, and engage in exploration for future viability (Levinthal and March, 1993).

There is an immense development of knowledge in this area, with special focus on the factors affecting organizational ambidexterity. Various factors are identified and proposed in the existing literature, which have a correlation with and affect organizational ambidexterity. This paper strives to review them systematically using meta-analysis and to summarize their correlation with organizational ambidexterity, thereby serving as a comprehensive model for future research on the topic. Meta-analysis uses the results proposed by papers that show a numerical correlation of the variables

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with organizational ambidexterity. The theory, context, characteristics and methodology (TCCM) framework further synthesizes and highlights the existing literature by discussing its theory, context, characteristics and methodology.

The key contributions of this research are twofold. First, this study makes a theoretical contribution by offering a proper understanding of the factors that affect ambidexterity which could guide managers in taking strategic decisions. This field is of enduring interest to scholars, and the existing knowledge base and research advancements in the antecedents of ambidexterity are constantly evolving. Second, this paper addresses the need to compile, summarize and analyse previous research efforts. Use of meta-analytical technique would result in significant gains of inferential power over narrative and other qualitative methods. The large sample size, analysis by a systematic study and a combination of statistics ensure that the findings are relevant in today's scenario, and provide a reliable base and direction for further research.

In the next section, the paper discusses the literature review and hypotheses followed by a meta-analysis of 43 studies. Finally, discusses results, implications and concludes with the TCCM framework followed by recommendations for future research.

2. LITERATURE REVIEW

The extant literature studies the antecedents of organizational ambidexterity in diverse contexts across different industries. Organizations face the challenge of advancing a capability with the two fundamental concepts of exploration and exploitation that come from distinct knowledge-processing capabilities (Floyd and Lane, 2000; Koryak *et al.,* 2018). Exploitation refers to the actions which refine and expand the existing setup and concentrates more on the choice and application of the available and existing knowledge while contrarily exploration refers to the process of looking for opportunities by investigation and recombination to deepen knowledge and develop better competencies compared to the existing ones (Jansen et al., 2008; Lavie et al., 2011). While the domination of exploitation leads to routines below the standards, an increased focus on exploration may increase the experimentation costs (Nielsen, B. B., & Gudergan, S., 2012). Organizations often find it difficult to efficiently take out time and pursue both explorations to take care of the present demands and exploitation to tap future potentials (March, 1994; Koryak *et al.,* 2018). For the improvement of exploration or exploitation, some antecedents of ambidexterity must be jointly considered (March, 1994). This paper thoroughly discusses each antecedent of ambidexterity identified, and its impact on organizational ambidexterity is analysed.

2.1 Antecedents of Ambidexterity

Table 1 list all the factors which are identified from the literature.

2.1.1 Firm-Level Factors

Firm-level antecedents are those factors which depend on the organization concerning its establishment, internal structures, policies and procedures, access to resources, values and the orientation of the people running the organization. They are broadly studied under the heads of the organization, innovation and, management and structure.

2.1.1.1 Firm Characteristics

Firm age and size

Age influences the ability of an organization to adapt and the extent of rigidness (Autio *et al.*, 2000). Age is measured as the natural log of the tenure of the firm which is the number of years since

Table 1. List of factors taken for meta-analysis

Level	Factor	No. of papers	N (Sample Size)
Firm-level factors	**FIRM CHARACTERISTICS**		
	Age	13	2380
	Size	22	5345
	Branch location	2	505
	Organizational diversity	3	1440
	Operational Experience	2	319
	INNOVATION		
	Environment/ resource munificence	4	842
	R&D Intensity	4	3730
	Radical Innovation	3	551
	Incremental innovation	2	365
	STRUCTURE AND PROCESSES		
	Social climate	5	747
	Manager's Education	4	5192
	Manager's Age	3	4476
	Hierarchical level	2	1053
	Team Tenure	7	5068
	Centralization	2	304
	Cross-Functional Co-ordination	2	369
	Resource interdependency	2	622
Industry-level factors	Industry type	32	15835
	Technology dynamism	2	149
	Environmental dynamism	15	7862

establishment (Lubatkin et al., 2006; Heavey and Simsek, 2017; Cao et al., 2009; Lin et al., 2017). Young firms studied in this literature are ten years old or younger, related mainly to technology and manufacturing industries (Fernhaber and Patel, 2012).

Owing to their limited operational history, young firms, are in the early stages of developing structured procedures, which in turn fosters a complex product portfolio in flexible young firms. However, the ambiguity that stems from a lack of formalization becomes a barrier to the coordination of a complex portfolio (Fernhaber and Patel, 2012). Older branches have experience in handling paradoxical situations with developed routines (Jansen *et al.*, 2012). There exist various study outcomes that show a positive correlation of organizational age with innovation (Sorensen and Stuart, 2000). These innovations develop by making existing technology more compatible, placing more importance on exploitation than exploration (Venkatraman *et al.*, 2007). A few arguments reveal the opposite. Young firms are more innovative because flexibility exists in their new establishment, and they can react faster to changes (Chen and Hambrick, 1995; King *et al.*, 2003).

H1: Age has true homogeneity in the effect sizes among studies.

The size of an organization is studied broadly under the size in terms of the scale of operations and the size of the managerial team (White *et al.*, 2020). The incorporation of ambidexterity has evolved over the years to keep up with the growing size of the organization. The trend of contextual ambidexterity being implemented in the initial stages after incorporation and then with growth in size increased complexity and globalization, the introduction of structural ambidexterity in the organizational system is widely noticed (Vahlne and Jonsson, 2017). Large size firms contribute more towards the cognitive requirements of undertaking exploration and exploitation activities because they contain a greater stock of cognitive resources (Heavey and Simsek, 2014). A few disadvantages of size are also pointed out by the studies. One major problem faced by big organizations is the success syndrome alongside the growth of size and development with age, because of the cultural inertia that takes root within the organization, placing barriers to achieving ambidexterity in the form of delayed decision making and hierarchy (Tushman and O'Reilly, 1996).

H2: Size has true homogeneity in the effect sizes among studies.

Firm Experience and Diversity

Organizational experience serves as a guide to the interpretation and evaluation of issues by the executives from the related domain (Eagly and Chaiken, 1998). The operational experience of an organization in the past makes the senior executives more ambivalent in the evaluation of issues (Plambeck and Weber, 2010). When the experience of an organization in its related domain increases, the knowledge structure increases in complexity and helps executives understand the issues more diversely and enables better ambivalent evaluations (Diestre *et al.*, 2015).When there is a lack of experience, the evaluations are more likely to be univalent (Hertwig et al., 2004). Executives tend to resort to generic frames, making it harder to recognize contingencies when operating in a firm that lacks experience (Diestre *et al.*, 2015). The opposite argument brings out negative aspects as well. It tends to emphasize exploitative activities more compared to exploratory ones, thereby leading to underutilized opportunities (Beckman, 2006; Heavey and Simsek, 2014).

H3: Organization's operational experience has true homogeneity in the effect sizes among studies.

Organizational diversity is the existence of a diverse set of beliefs and opinions, which appreciates and allows variation and welcomes diverse point of views and learning (Ferner *et al.*, 2005). A diversified organization makes top management more ambivalent when evaluating an issue (Jansen *et al.*, 2012). Diversity, which fosters creativity, channels group efforts and provides a common course and regulation (Rink and Ellemers, 2007). This helps to create an environment conducive to ambidexterity. The diversity that stems from accumulated experience leads to more detailed knowledge structures and schema in the unit's structure, procedures and team members, and induces executives to examine strategic issues with a wider perspective, consider diverse aspects and make effective ambivalent evaluations (Diestre *et al.*, 2015).

H4: Organizational diversity has true homogeneity in effect sizes in the studies.

Branch Location

The effect of branch location on ambidexterity is widely acknowledged in the literature (Plambeck and Weber, 2010). The location of branch is of great significance, for instance, nearness to consumers and suppliers, labour markets characteristics, accessibility to infrastructure facilities, and agglomeration and cluster effects or competition effects (Buckley and Casson, 1985; Jansen *et al.*, 2012). The proximity of the organization to population centres is also to be considered, as these give the organization more access to local markets (Plambeck and Weber, 2010).

H5: Branch location has true homogeneity in the effect sizes among the studies.

2.1.1.2 Innovation

Innovation is a chain of knowledge creation processes that enables units to solve problems (Datta, 2012). Exploration and exploitation represent two distinct learning orientations that must be balanced and under these orientations, innovative activities have different approaches (Koryak *et al.*, 2018). Explorative innovation occurs when knowledge and creative insights advance through experimentation; while the establishment of gradual improvements and refinements in knowledge is already present (Chang, 2015).

Research and Development Intensity

Research and development intensity point out to the magnitude of innovation that an organization introduces (Suzuki, 2015). It is largely determined by the long-term goals of the organization. While market and resource-oriented goals incline towards exploitation, knowledge-seeking goals encourage exploration (Flood and Romm, 1995; Lee *et al.*, 2014). The impetus to develop other business products tends to rise in response to thrust towards investments and people (Blindenbach-Driessen and Ende, 2014). On one hand, research and development improve the internal growth of discoveries and the flow of new information into the unit, thereby positively influencing exploration and on the other hand, there is a risk of over-engaging at the cost of developing complementary structures to exploit (Jennex, 2013; Yaseen et al., 2018).

H6: Research and development intensity has true homogeneity in the effect sizes among the studies.
Radical and incremental innovation

Innovation can be broadly classified as radical or incremental innovation. This helps an organization become more competitive to face the dynamic environment (Agrawal & Mukti, 2020). While radical innovation refers to principal changes that deviate widely from existing structures (Atuahene-Gima, 2005), incremental innovation focuses on making the system more efficient in meeting expectations through minute changes and alterations in the existing set-up, as an extension to it. The two types of innovation must be balanced to enable explorative structures to share important resources from exploitation structures (Kim *et al.*, 2018). Traditionally, under the bi-polar view of ambidexterity, exploration boosts radical innovations often at the cost of incremental innovation and exploitation enables efficiency through existing solution refinements often at the cost of breakthrough innovations (Gima, 2005). The radical and incremental innovations are reined in by contextual ambidexterity (Wang and Rafiq, 2014). One of the most demanding issues in an organization is the adoption of ambidextrous innovation that focuses on innovating, both to exploit present structures and also to explore new opportunities (Martin *et al.*, 2017). Integration of radical innovations involving risk-taking experimentations, and incremental innovations requiring efficiency is important (Wang and Rafiq, 2014).

H7: Radical innovation has true homogeneity in the effect sizes among the studies.
H8: Incremental innovation has true homogeneity in the effect sizes among the studies.
Environment and Resource Munificence

Environment and resource munificence play key role in innovation. Perceived environmental munificence refers to the top personnel's opinion about continual growth being supported by the external habitat of the industry (Sutcliffe and Huber, 1998). This encourages the firms to 'sail

through' environmental changes (Plambeck, 2012; Wang and Kwek, 2018). Dynamic capabilities allow the organization to efficiently withstand and develop on these changes. Dynamic capabilities can be described as the capability to regularly conceive, expand, develop and maintain the firm's unique asset base compatibility with activities undertaken (Birkinshaw*et al.,* 2016; Teece, 2007). A munificent environment eases the resource limitation on ambidextrous organizations, helping them to obtain increased performance gains (Jansen *et al.*, 2012). The availability of more resources within the organization builds on this confidence. Utilizing available resources to counter change removes the tensions that arise from the scarcity of funds (Gupta et al., 2006). This further provides the impetus to pursue exploratory and exploitative practices, to capitalize the opportunities presented in the form of environment changes (Abdullah & Saifi, 2019; Akram & Ghosh, 2019; Zhang & Chen, 2019). These slack resources also moderate the positive relationship of exploratory activities with the intuition to capture foreign markets and to globalize (Dasí *et al.*, 2015).

H9: Environment and resource munificence has true homogeneity in the effect sizes among the studies.

2.1.1.3 Management and Structure

Structural and contextual view point towards the role of managers as key drivers of ambidexterity (Chang, 2015). This is reflected in the top management literature, showing that over time the organization reflects the top managers (Hambrick and Mason, 1984). Ambidextrous managers have three interrelated characteristics: they can hold onto contradictions, multitask, and continuously build and stimulate knowledge and expertise (Mom *et al.*, 2015).

Top management age and education

Top management teams influence to a large extent the organization's ability to be ambidextrous, as they are the key decision-makers (Raisch and Birkinshaw, 2008). The age and education of top management influence their decisions, thereby impacting ambidexterity (Chang, 2015). Their skills and capabilities influence the decisions of top management (Kogut and Zander, 1992). Management heterogeneity and size positively impact and reinforce exploration; team size increases the positive relation of heterogeneity of management with exploration (Koryak *et al.*, 2018).

H10: Managers' age has true homogeneity in the effect sizes among the studies.
H11: Managers' education has true homogeneity in the effect sizes among the studies.
Managerial Hierarchy

Hierarchy is the organizational setting for classifying the positions. The literature supports a positive relationship of hierarchy with ambidexterity (Tushman and O'Reilly, 1996). It is commonly observed that there exists more ambidextrous orientation in top management compared to the lower levels (Floyd and Lane 2000; O'Reilly and Tushman, 2004). Studies suggest that top management must exhibit an ambidextrous orientation, to gain a balanced allocation of resources for exploration and exploitation (Joshi & Chawla, 2019; Massingham & Pomering, 2018; Oliveira & Alegre, 2019). These contradictory activities must be integrated at the lower levels of the hierarchy as well, as even those managers would have to act ambidextrously to improve performance (Gibson and Birkinshaw, 2004).

H12: Hierarchy has true homogeneity in the effect sizes among the studies.
Team Tenure

The tenure or duration of experience within the organization plays a role in managers' orientation towards cognitive and behavioural skills, and also in the push to implement set behaviours and the knowledge acquisition attached to the team (Beier and Ackerman, 2001; McEnrue, 1988). Previous meta-analytical studies also present that work experience is a key driver of behaviour and shapes behaviour-driving cognitive practices (Mom *et al.*, 2009). Specialization moderates the impact on ambidexterity and there is an inverse relationship between tenure in current function and organizational ambidexterity: higher specialization tends to decrease the orientation towards change (Gibson and Birkinshaw, 2004).

H13: Team tenure has some homogeneity in the effect sizes among the studies.

Centralization

Centralization is a key aspect of the structure. It is related to the contribution of hierarchical procedures and formal authority in the decision-making process of the organization (Ghoshal and Nohria, 1993). Extant literature draws its parallel with collectivism. The extent to which individuals value group goals and associate themselves with the membership is referred to as collectivism (Hofstede, 1984; House *et al.*, 2004). By lifting the tensions between the conflicting orientations of exploration and exploitation, collectivism aligns resources withan ambidextrous orientation (Yang *et al.*, 2015). On the one hand, following of a centralized approach for taking decisions is inversely related to collectivism and has a negative impact on it, thereby affecting ambidexterity (Yang *et al.*, 2015). It means that all the key decisions lie with top management, who are more specialize in experience and knowledge (Sheremata, 2000). The advantage of power lying in the hands of specialists is reduced, because of the delayed decision making that comes from increased hierarchy, and its associated costs (Teece, 2007). On the other hand, a decentralized organization facilitates the adaption of contrasting demands in ambidextrous units, with limited barriers from top hierarchy fostering performance (Siggelkow and Levinthal, 2003; Jennex, 2008).

H14: Centralization has some homogeneity in the effect sizes among the studies

Coordination

Cross-functional coordination is part of the discussion on integration. Knowledge exchange and collective coordination demand the existence of a mechanism called 'cross-functional coordination', which brings together individuals and from equivalent levels and carries out various functions (Batra and Dhir, 2019; Gupta and Govindarajan, 2000). It is vital for such a mechanism to be in place within an organization, for better cooperation, understanding and exchange, which helps in the generation of ideas that fosters ambidextrous orientation (Jennex and Olfman, 2005; Tempelaar and Rosenkranz, 2017).

H15: Cross-functional coordination has true homogeneity in the effect sizes among the studies.

Social Climate

The social climate is identified as the distinct facets, such as the volume of mutual cognitions, beliefs and cooperative connections that lie within individuals (Collins and Smith, 2006; Tsai and Ghoshal, 1998). It is recognized that a social climate that fosters high trust provides avenues for leaders to assist employees and to display supportive behaviour that pushes firms to exhibit exploration and exploitation activities concurrently (Chang, 2015). High-involvement human resource practices foster the social climate through better team capabilities, encouragement and opportunities to blend, and they bring together and develop learning, thereby paving the way for the undertaking of exploratory and exploitative activities together (Argote *et al.*, 2003; Collins and Smith, 2006; Kaše *et al.*, 2009).

H16: Social climate has true homogeneity in the effect sizes among the studies.

Resource Interdependency

Resource characteristics may accentuate the complexities of an ambidextrous organization as the task requires more coordination across units (Jansen *et al.*, 2012). Resource interdependency shows the degree to which a firm's unit depends on another unit for its operations (Thompson, 1967; Tushman and Nadler, 1978). For effective operation, resource interdependency necessitates multiple changes in concurrence with other units, and this coordination is an important moderator affecting the effectiveness of unit behaviour (Miller, 1991). It is vital to divide the resources for the exploration and exploitation activities of each unit, to allow units to become ambidextrous in their operations and to attain better performance (Jansen *et al.*, 2012). Resource-independent units fail to arrange for the required resources when needed, and in turn make a regular oscillation between exploration and exploitation difficult (Jansen *et al.*, 2012).

H17: Resource interdependency has true homogeneity in the effect sizes among the studies.

Industry-Level Factors

Industry Type

The industry type is an external factor affecting ambidexterity. Industry effects determine the magnitude to which exploratory and exploitative activities are undertaken in an organization (He and Wong, 2004; Sidhu *et al.*, 2007). Each industry type is distinctly identified with an environment type (Chen *et al.*, 2016). Some industries are extremely dynamic, while others are comparatively more stable (Roth and Morrison, 1990). Studies on the antecedents of ambidexterity are done in a limited number of industries that are constantly evolving and catering to other industries as well, such as manufacturing and technology.

H18: Industry type has true homogeneity in the effect sizes among the studies.

Technological Dynamism and Environmental Dynamism

Technological dynamism is an important part of industry-level factors affecting ambidexterity. The opportunities available to capitalize on changes in the environment are greatly influenced by the rate of technological change (Heavey and Simsek, 2014). Decisions taken by top management depend greatly on the magnitude of environmental dynamism, (Jansen *et al.*, 2008; Lubatkin *et al.*, 2006). The presumption of a stable environment discourages an individual from devoting sufficient time to exploration and exploitation activities, thereby making the organization stagnant in development (Plambeck and Weber, 2010). The presumption of a dynamic environment encourages managers to invest in innovations and to implement them at the right time, thereby making the unit ambidextrous (Jansen *et al.*, 2008). A dynamic environment means that the attention of managers lies across a diverse spectrum of issues in a limited time-span, making it important to remain alert (Eisenhardt, 1989; Dhir *et al*., 2020). Higher levels of dynamism lead to an increased exploration orientation as the unit attempts to reduce uncertainties with a wider search that helps it to develop new and timely ways to handle external advancements (Lubatkin *et al.*, 2006; Nosella *et al*., 2012).

H19: Technological dynamism has true homogeneity in the effect sizes among the studies.

H20: Environment dynamism has true homogeneity in the effect sizes among the studies.

3. RESEARCH METHODOLOGY

The existence of a plethora of literature in the field of organizational ambidexterity necessitates compilation and synthesis. The statistical technique of meta-analysis helps overcome this problem and has been used in this paper to systematically review existing studies (Junni *et al.*, 2013; Fourné *et al*., 2019). Meta-analysis quantitatively summarizes the results of multiple primary studies and offers a heuristic for estimating effect size of factors affecting organizational ambidexterity using previous study results (Huang and Tsai 2013; Hunter and Schmidt 2004). The statistical edge given by meta-analysis compared to the traditional theoretical systematic review makes meta-analysis effective in addressing the issue (Lipsey and Wilson 2000).

With the focus on papers related to antecedents of ambidexterity, a total of 151 research papers related to organizational ambidexterity were accessed by an exhaustive search across all major academic databases (google scholar, Ebsco, Wiley online library). A total of 43 empirical papers were considered for the meta-analysis. The papers were considered based on two different criteria for conducting the meta-analysis. Firstly, we considered studies which have their dependent variable as organizational ambidexterity. Further, all the papers were thoroughly studied and only empirical papers with the same methodology used were considered for the analysis. Meta-analysis can be conducted for means, variances, regression, correlation.

For this study, correlation is used as a common measure. Out of 151 papers, 43 papers amongst them that have a comprehensive correlation of the antecedents with organizational ambidexterity are selected and used for meta-analysis. Papers that had indirect correlations with exploration and exploitation are also used by adding them to attain the combined ambidexterity. Ninety variables are taken from these papers. Out of these, many variables that showed a great degree of similarity were combined (E.g. Manager's bachelor and master's degree was combined with the Manager's education). Variables that are mentioned in less than 2 papers were dropped. This process of filtering brought down the total variables for the meta-analysis to 20. These were further classified into firm-level and industry-level factors. This review paper uses the Comprehensive Meta-analysis software.

For the meta-analysis, the random effect size technique was followed as prescribed by Hunter and Schmidt (2004). The Hedge's *g* effect size is calculated for the analysis which measures the difference between means (Rosenthal *et al*., 1994). The analysed effect sizes and standard errors help in identifying the homogeneous or heterogeneous nature of the antecedents. This is done by calculating the Q statistics (Lipsey & Wilson, 2001). Q statistics, which is a standard measure of heterogeneity in effect sizes among various research and studies, is calculated using the following equation (Lipsey and Wilson 2001) $Q = \sum\left(W * ES^2\right) - \frac{\sum\left(W * ES\right)^2}{\sum W} \sim \chi 2_{(K-1),}$ where W=Relative Weight and ES=Effect size.

The tabulated Q measured as a CHIINV statistics with (k-1) degrees of freedom (df) where k is the number of studies and confidence of interval of 95% is arrived at. When the meta-analysis is performed with a limited number of studies, Q statistics fails to portray an accurate picture of heterogeneity (Higgins et al. 2003). Q has more power as a test of heterogeneity when the papers considered is larger (Higgins et al. 2003). These statistics become ineffective in testing true heterogeneity among studies. I^2 test helps overcome this drawback of Q Statistics by elucidating the percent of variation across studies. I^2 test quantifies the degree of heterogeneity.

4. RESULTS

Table 2 reports the number of effect sizes (k), sample weighted correlation ($_r$) and the standard error of sample weighted, weights of each antecedent (w) and effect size (Hedge's g). Table 3 represents the Q statistics and I^2 test. Radical innovation and social climate show a high level of heterogeneity and

cannot be pooled with the results. Therefore, they are not accepted. All the industry level antecedents that have been taken into consideration – industry type, technological dynamism, and environmental dynamism can be accepted as the available literature on them are homogeneous and they agree with the null hypothesis in Q statistics. Most of the antecedents of ambidexterity are firm-level factors- age, size, branch location, environment/ resource munificence, organizational diversity, social climate, R&D Intensity, incremental innovation, radical innovation, manager's education and age, hierarchical level, team tenure, international experience, cross-functional coordination, resource interdependency, and centralization. These firm-level factors show mixed results as not all factors are homogeneous. The application of Q Statistics in social climate and radical innovation reject the null hypothesis, thereby indicating the presence of heterogeneity. To understand the extent of homogeneity, whether acceptable or not, the I^2 test has been used. The finding shows heterogeneity of 94% in social climate and 97.5% in radical innovation, thereby making these factors non-acceptable. This gives us a total of 18 factors that are acceptable as the antecedents of ambidexterity.

4.1 TCCM Analysis

This section discusses the literature for the TCCM framework: theory, context, characteristics and methodology. Appendix 4 highlights the papers and the TCCM framework.

4.1.1 Theory Development

In the field of ambidexterity, the literature reveals that theories such as dynamic capability theory, resource-based view, social exchange theory and behavioral theory are prominently used (Floyd and Lane, 2000; Koryak *et al.,* 2018; Liu *et al.*, 2019). Thus, for future studies, new theoretical lenses could be applied to explicate the uncovered areas, such as how external factors affect ambidexterity. Moreover, new theoretical lenses could be explored from the point of view of different types of industries in different countries. Further, these theories could be used as a platform for future studies in empirical analysis, for antecedents of ambidexterity.

4.1.2 Context

With the identification of antecedents and outcomes of ambidexterity, there has been a tremendous advancement of knowledge in this field. Appendix 1 shows that studies have been undertaken mostly in the context of developed nations, such as the USA, Germany and Spain, and only one developing nation, China. Therefore, the base is so limited that it is difficult to conclude them. Also, studies in the area of antecedents of ambidexterity have been carried out in a limited number of industries, such as high technology and manufacturing (Jansen *et al.*, 2012; Junni *et al.*, 2013). Therefore, future studies could be carried out in different industries and different countries, to provide generalizability of results.

4.1.3 Characteristics

The literature on the antecedents of ambidexterity has focused mostly on exploration and exploitation (Cao et al., 2009; Dhir, Ongsakul, & Batra, 2018; Zhan & Chen, 2013). Further, the three modes of adaption that a firm can implement in response to the discontinuities in the environment have been discussed (Jansen *et al.*, 2008; Lubatkin *et al.*, 2006). They are structural separation, behavioural integration and sequential alteration. The literature on organizational ambidexterity frequently addresses the issue of its implementation. It has been widely discussed that the decision regarding the amount of time devoted to the processes of exploration and exploitation plays a vital role in making an enterprise ambidextrous in its operations (Gibson and Birkinshaw, 2004). Given the concept of ambidexterity and the various modes of adaption, there are different approaches to organizational ambidexterity that have been widely investigated: sequential ambidexterity, structural ambidexterity and contextual ambidexterity (Shibata *et al.*, 2019). Future studies could explore the moderating effect of various antecedents, such as environmental dynamism and technological dynamism.

Table 2. Meta-analysis results

Factors	r	k	Hedges g	Standard error	Weights	Citations
FIRM LEVEL						
Age	0.03	2380	0.06	0.04	4.16	Fernhaber and Patel, 2012 Jansen et al., 2012 Plambeck and Weber, 2010 Lubatkin et al., 2006 Heavey and Simsek, 2017 Jasmand et al., 2012 Jansen et al., 2009 Chen and Jin, 2015 Lin et al., 2017 Tuan, 2016 Suzuki, 2015 Li, 2014 Cao et al., 2009
Size	0.02	5345	0.04	0.03	9.36	Fernhaber and Patel, 2012 Jansen et al., 2012 Plambeck and Weber, 2010 Tempelaar and Rosenkranz, 2006 Lubatkin et al., 2006 Heavey and Simsek, 2017 Clercq et al., 2013 Haveli et al., 2015 Im and Rai, 2008 Mom et al., 2009 Jansen et al., 2009 Chen and Jin, 2016 Lin et al., 2017 Tuan, 2014 Smith and Umans, 2015 Suzuki, 2015 Li, 2014 Stubner et al., 2012 Cao et al., 2009 Jansen et al., 2012
Branch location	-0.08	505	-0.16	0.09	0.88	Jansen et al., 2012 Plambeck and Weber, 2010
Environment/ resource munificence	0.03	842	0.06	0.07	1.47	Fernhaber and Patel, 2012 Jansen et al., 2012 Plambeck and Weber, 2010 Cao et al., 2009
Organizational diversity	0.28	1440	0.58	0.05	2.52	Wang and Rafiq, 2014 Cummings, 2013 Venkatraman et al., 2007
Social climate	0.37	747	0.79	0.08	1.3	Prieto and Santana, 2012 Dutta, 2013 Patel et al., 2013 Gibson and Birkinshaw, 2004 Nemanich and Vera, 2009
R&D Intensity	0.4	3730	0.87	0.04	6.53	Heavey and Simsek, 2017 Blindenbach-Driessen and Ende, 2014 Mom et al., 2009 Suzuki, 2015
Radical innovation	0.4	551	0.87	0.09	0.96	Wang and Rafiq, 2014 Tan and Liu, 2014 Patel et al., 2013
Incremental innovation	0.28	365	0.59	0.11	0.63	Wang and Rafiq, 2014 Patel et al., 2013
Manager's education	0.04	5192	0.07	0.03	9.09	Mom et al., 2015 Mom et al., 2009 Chang, 2015
Manager's age	0.02	4476	0.05	0.03	7.83	Mom et al., 2015 Mom et al., 2009 Chang, 2015
Hierarchical level	0.22	1053	0.46	0.06	1.84	Mom et al., 2015 Mom et al., 2009

continued on following page

Table 2. Continued

Factors	r	k	Hedges g	Standard error	Weights	Citations
Team tenure	0.02	5068	0.04	0.03	8.87	Tempelaar and Rosenkranz, 2006 Lubatkin et al., 2006 Heavey and Simsek, 2017 Fernhaber and Patel, 2012 Mom et al., 2015 Mom et al., 2009 Chang, 2015
Operational experience	0.1	319	0.2	0.11	0.55	Plambeck and Weber, 2010 Heavey and Simsek, 2017
Cross-functional co-ordination	0.31	369	0.66	0.11	0.64	Tempelaar and Rosenkranz, 2006 Jansen et al., 2009
Resource interdependency	0.24	622	0.49	0.08	1.08	Jansen et al., 2012 Mom et al., 2015
Centralization	-0.04	304	-0.08	0.12	0.53	Yang et al., 2014 Mihalache et al., 2014
INDUSTRY LEVEL						
Industry type	-0.01	15835	-0.02	0.02	27.73	Blindenbach-Driessen and Ende, 2014 Haveli et al., 2015 Tuan, 2014 Suzuki, 2015 Plambeck and Weber, 2010 Lubatkin et al., 2006 Im and Rai, 2008 Mom et al., 2015 Rodriguez and Hechanova, 2014 Chang, 2015 Cao et al., 2009 Tempelaar and Rosenkranz, 2006 Lubatkin et al., 2006 Clercq et al., 2013 Jansen et al., 2009 Li, 2014 Lin at al., 2017
Tech dynamism	0.26	149	0.54	0.17	0.26	Heavey and Simsek, 2017 Suzuki, 2015
Environmental dynamism	0.09	7862	0.17	0.02	13.77	Fernhaber and Patel, 2012 Jansen et al., 2012 Haveli et al., 2015 Mom et al., 2009 Jansen et al., 2009 Li, 2014 Plambeck and Weber, 2010 Lubatkin et al., 2006 Im and Rai, 2008 Mom et al., 2015 Rodriguez and Hechanova, 2014 Chang, 2015 Cao et al., 2009

4.1.4 Methodology

As reported in Appendix 1, the most widely used methodology is regression analysis. A few studies have also used structural equation modelling. Future studies could explore other quantitative and qualitative techniques, such as case studies, interview and review. Recent techniques have also been suggested such as total interpretive structural modelling (TISM) (Sushil, 2012), which is a qualitative advanced modelling technique, capable of explaining the what, how and why of model building (Hasan *et al.*, 2019).

Table 3. Q and I^2 results

Factors	Q statistics	Result	I^2 test
FIRM LEVEL			
Age	1.97	accepted	
Size	5.13	accepted	
Branch location	1.35	accepted	
Environment/ resource munificence	9.21	accepted	
Organizational diversity	14.65	accepted	
Social climate	69.35	not accepted	0.94
R&D Intensity	25.05	accepted	
Radical innovation	82.27	not accepted	0.98
Incremental innovation	36.89	accepted	
Manager's education	0.82	accepted	
Manager's age	0.49	accepted	
Hierarchical level	9.24	accepted	
Team tenure	2.11	accepted	
Operational experience	2.72	accepted	
Cross-functionalco-ordination	19.79	accepted	
Resource interdependency	12.11	accepted	
Centralization	20.62	accepted	
INDUSTRY LEVEL			
Industry type	9.21	accepted	
Tech dynamism	13.36	accepted	
Environmental dynamism	16.70	accepted	

5. DISCUSSION AND IMPLICATIONS

This study draws on the analysis of meta-analytical review and literature through TCCM analysis of 43 journal articles. Through a thorough study of the literature, the growing importance of organizational ambidexterity has been immensely noticed. On the one hand, the results of the meta-analysis provide an insight into the antecedents of ambidexterity and elucidate the strength of the correlation of these antecedents with organizational ambidexterity, making the way for a better understanding of the concept. This study focuses on 20 major antecedents of organizational ambidexterity. On the other hand, TCCM examines the details of the theory used, characteristics, context and the methodology adopted in the past literature. This study has significant implications for both managers and scholars. Firstly, this study filled the gap in the area of the antecedents of organizational ambidexterity, why and how there are diverse views on the above two factors (social climate and radical innovation), and what role or effect they have in achieving organizational ambidexterity. Secondly, a comprehensive understanding of the antecedents will help management have a more structured approach to ambidexterity by analyzing resources and competencies. Thirdly, the use of a large sample size to derive the results makes them more relevant to the real business scenario. Finally, managers must focus on the linkages between different levels in an organisation for achieving ambidexterity. Firm

characteristics, strategy, structure, people and processes must be aligned to achieve organisational ambidexterity (Gibson and Birkinshaw, 2004)

Regression analysis and meta-analysis have been used in diverse topics with mixed approaches; however, some areas are still unexplored. A further study could be made to determine the relationship of organizational ambidexterity with performance and growth (sales, employees, financial, etc.) and to study in detail the moderators in the relationship. One of the major drawbacks faced by a meta-analysis study is that only fundamentally correlational papers are considered, leaving papers that do not provide a numeric correlation of a factor with ambidexterity. Therefore, future research could be conducted to overcome these drawbacks.

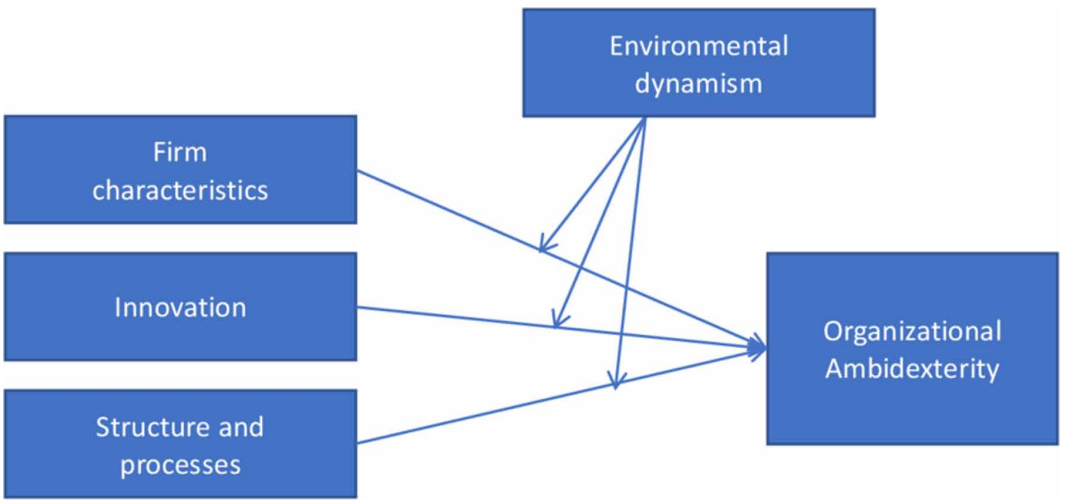
6. DIRECTIONS FOR FUTURE RESEARCH

The paper conducted a meta-analysis and TCCM framework on the literature of organizational ambidexterity in the past 30 years. The extensive analyses provide theoretical insight into the current status and also helped us to identify certain gaps in the current knowledge on the antecedents of ambidexterity and hence put ahead research agenda for the future.

6.1 Framework 1

In the first framework, we propose to study the moderating effect of environmental dynamism on the relationship between antecedents and ambidexterity. This study would further help to understand, how the changes in the environment affect the relationship between the firm-level factors and ambidexterity as shown in figure1.

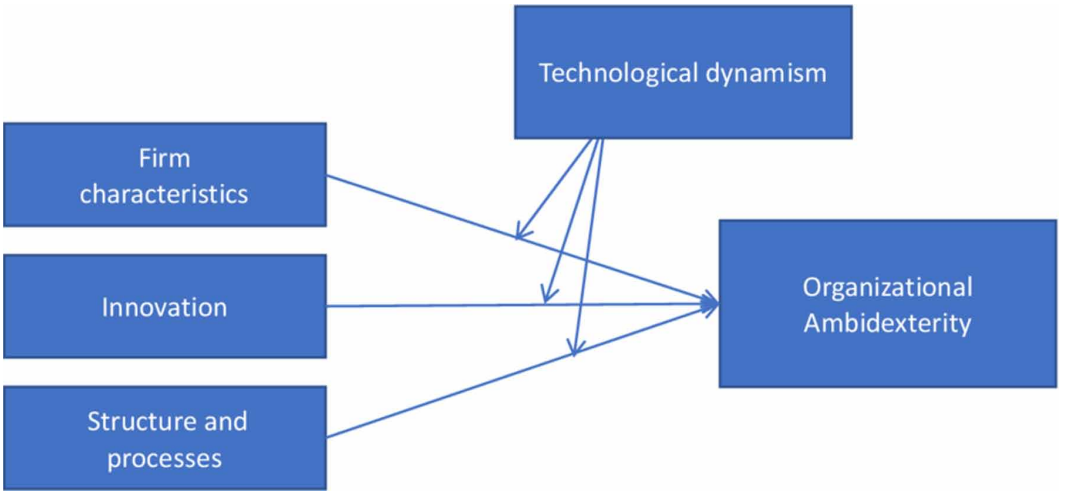
Figure 1. Conceptual framework with environmental dynamism as a moderator for ambidexterity



Framework 2

In the second framework, we propose to discuss the moderating effect of technological dynamism on the relationship between industry-level factors and ambidexterity. This study would further help to understand, how the changes in the technology affect the relationship between the firm-level factors and ambidexterity as shown in figure 2.

Figure 2. Conceptual framework with technological dynamism as a moderator for ambidexterity



7. CONCLUSION

The meta-analysis and TCCM framework conducted in this study provide a comprehensive picture of the antecedents of organizational ambidexterity. The main focus of this paper has been to understand the foundation of organizational ambidexterity: its antecedents. Meta-analysis papers have an immense impact on and guide succeeding studies because they efficiently collect and unify the extant literature on the topic. The detailed meta-analytical study of the antecedents of organizational ambidexterity performed in this research paper identified 18 acceptable factors classified into firm-level and industry-level. The impact of radical innovation and social climate on ambidexterity remains to be confirmed by further research carried out within this framework as the findings indicate that there is heterogeneity in the extant literature relating to their impact on ambidexterity. Further, the study provides a reserve for the further development of this study design, using more papers and other methods to determine effect size. The study also analyses the homogeneous and heterogeneous nature of the factors. This study adds to the literature of organisational ambidexterity. Finally, this study provides a theoretical insight into the factors affecting both firm and industry level- affecting organizational ambidexterity. Future research on this area may benefit from analysing the type of impact and analysing the interdependencies of the factors.

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APPENDIX 1

Table 4. Studies used for TCCM and meta-analysis

Author	Theory	Context	Characteristics	Methodology
Fernhaber, & Patel	Dynamic capabilities	Technology firms	Managing a balance of innovations	Regression
Jansen, Simsek, & Cao	Dynamic capabilities	European financial firms	Structural and resource attributes	Hierarchical linear modelling
Plambeck, & Weber	Behavioural theory	European Union	prevalence of interpretive ambivalence at the executive level	Structural Equation Modelling (SEM)
Tempelaar, & Rosenkranz	Knowledge based	Multinationals	Role segmentation influences	Regression
Lubatkin, Simsek, Ling, &Veiga	Behavioural	New England	Pivotal role of top management team	SEM
Heavey, & Simsek	Distributed cognition	Technology firms	Top management teams	Regression
Jasmand, Blazevic, & Ruyter	Regulatory mode	call centre	CSR's locomotion orientation	Regression
Clercq, Thongpapanl, &Dimov	Social Exchange	Canadian-based SMEs	Higher levels of internal rivalry are amplified	Regression
Driessen & Ende	Organisation	Dutch	separate innovation unit	Regression
Halevi, Carmeli, &Brueller	Social Exchange	SBU's	Behavioural integration	Regression
Im, & Rai	Dynamic capabilities	Customers	Knowledge sharing	Regression
Mom, Bosch, &Volberda	Behavioural	Fortune Global 500	Manager's decision-making authority	Regression
Mom, Fourné, & Jansen	Contingency	Fortune Global 500	Managers' capabilities	Regression
Mom, Bosch, &Volberda	Behavioural	Top 25 on the Fortune Global 500	Formal structural and personal coordination	Regression
Jansen, Tempelaar, Bosch, &Volberda	Dynamic capabilities	4,000 firms	Structural differentiation	Regression
Chen, Tang, Cooke, &Jin	Information processing	Chinese firms	Top management team effectiveness	Regression
Lin, McDonough, Yang, & Wang	Alignment	Chinese firms	The combination of organizational, human, and social capital	Regression
Tuan	Social Exchange	Vietnam	Entrepreneurial features	SEM
Smith, &Umans	Organizational	Swedish firms	Managerial focus influences	Regression
Rodriguez, Hechanova, & Regina	Social Exchange	Information technology	Collectivist characteristics	Regression
Suzuki	Dynamic capabilities	Pharmaceutical firms	Ambidexterity and organizational performance	Regression
Li	Social Exchange	Chinese firms	Diverse teams	Regression
Chang	Social Exchange	Banks	Firm-level social climate	Hierarchical linear modelling
Stubner, Blarr, Brands, & Wulf	Contingency	Germany	Family power and cultural alignment between family and firm interests	Regression
Cao, Gedajlovic, & Zhang	Agency	China	Managers in resource-constrained	Regression
Wang, & Rafiq	Organisation learning	150 UK and 242 Chinese	New product innovation	SEM
Yang, Zhou, & Zhang	Organizational effectiveness	China	Creating collectivistic culture within organizational	Probit model

continued on following page

Table 4. Continued

Author	Theory	Context	Characteristics	Methodology
Prieto, & Santana	social Exchange	Spanish	High-involvement human resource practices related to the social climate	Regression
Wei, Yi, & Guo	Absorptive capacity	China	Resource flexibility and coordination	Regression
Tan, & Liu	Resource-based	Chinese	Proactive market orientations - innovation	Regression
Dutta	Organizational	Firms	Organizational context plays the role of a catalyst effect	Regression
Stettner, &Lavie	Resource based	U.S. firms	Exploring via externally oriented modes	Performance model
Kostopoulos, Bozionelos, &Syrigos	Social Exchange	US Fortune 500	Unit human and social capital	Hierarchical linear modelling
Bozionelos, &Syrigos	Behavioural	Spanish	Human resource support	Regression
Cumming	Dynamic capabilities	Contemporary motion picture industry	Firm performance is related to structure	Regression
Patel, Messersmith &Lepak	Dynamic capabilities	Chinese	Alignment & the adaptability	Regression
Chang	Social Exchange	Taiwanese	Separate units	Hierarchical linear modelling
Gibson, &Birkinshaw	Dynamic capabilities	Business units	Combination of stretch, discipline, support, and trust	Regression
Mihalache, Jansen, Bosch, &Volberda	Leadership	Chinese	Leadership	Regression
Venkatraman, Lee, &Iyer	Organization	Malaysia and Singapore	Organizational adjustments	Regression
Nemanich, & Vera	Social learning	US	Transformational leadership behaviour	Regression
Menguc, &Auh	Resource-based view	Australian	Boundary-spanning culture, such as market orientation	SEM
Koryak, Lockett, Hayton, Nicolaou, & Mole	Behavioural	UK	Knowledge processing capabilities	Regression

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