

A meta-analytical review of factors affecting the strategic thinking of an organization

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Abstract

Purpose – *The purpose of this paper is to conduct a structured review of the literature on the factors affecting the strategic thinking of an organization. This study offers some theoretical insights by analysing the divergent or analogous views of authors on these factors by analysing the empirical studies carried out in the literature.*

Design/methodology/approach – *An empirical method of conducting a structured literature review has been adopted in this study. Theory context characteristic methodology framework and meta-analysis are the methodologies applied to analyse the different empirical studies conducted in the literature and determine the variation or similarities in the views of authors over the same factor based on their effect sizes. This study analyses over 45 different empirical studies in the literature conducted on the factors affecting strategic thinking.*

Findings – *This study explains how the factors have been similarly or differently explained by the authors in the literature. This analysis gives a better understanding of the factors affecting strategic thinking and quantitatively amalgamates the current empirical studies carried out in the literature. The effects sizes generated for each factor helps in determining the homogeneous or heterogeneous nature of the factor.*

Research limitations/implications – *The study is limited only to analyse the homogeneity or heterogeneity of the factors affecting strategic thinking at an organisational level. This study can be further extended by analysing the type of effect these factors have on the strategic thinking of the organisation.*

Practical implications – *The findings of this study identify the homogeneity or heterogeneity of the factors affecting strategic thinking in an organisation. This helps the top management to concentrate on these factors, which might develop a strategic thinking nature in the organisation, leading to the better formation of strategies, and successfully implement them in their businesses.*

Originality/value – *The study fills the unattended gaps in the literature by analysing the homogeneous and heterogeneous nature of the factors affecting the strategic thinking of an organisation.*

Keywords *Analysis, Thinking, Strategy, Strategic thinking, Meta-analysis, Homogeneity, Heterogeneity, Effect size*

Paper type *Research paper*

1. Introduction

The concept of strategic thinking and its importance is discussed in the extant literature (Table A1), it can be defined as the attitude of an organisational thinking process which drives smart actions and the will to inspire the entire firm to work towards a goal (Hamel and Prahalad, 1994; Mintzberg, 1987; Bonn, 2005; Alsaaty, 2007; Dhir *et al.*, 2018; Dhir, 2016, 2017), achieving the competitive advantage over the competitors and asserting an act of creating a new business venture (Shaheen *et al.*, 2012; Kazmi and Naaranoja, 2015). Thinking strategically can discover new, imaginative strategies that can be used to shape the competitive game (Heracleous, 1998; Warren *et al.*, 2011). In the early 1980s, strategic

Received 14 August 2019
Revised 25 October 2019
Accepted 25 November 2019

thinking was termed strategic issue defined as management of issues in real-time while compared to strategic planning which deals with periodic assessment of problems (Ansoff, 1980). Strategic thinking is also termed as strategic foresight which speaks of the mission and vision of an organisation and how the organisations achieve an advantage by forecasting the issues and addressing them (Ansoff, 1988; Martinet, 2010). Building up an administration framework to direct strategic thinking in changing markets is progressively basic for researchers and executives in adapting to the complex and quickly changing worldwide business conditions (Liedtka, 1998; Goldman, 2014; Rahnama and Rahpeyama, 2015). To grow, or even to maintain their current sizes, business firms have to seek continually (or invent) new marketable products, new methods of marketing them or even new ways of financing their activities (Simon, 1993). Many questions remain about the neural mechanisms underlying strategic thinking and heuristics, learning and social utility (Camerer, 2003). The new ways of thinking empower by allowing to exercise agency over a longer arc of time and across a wider interpersonal space (Larson and Hansen, 2005). Thinking helps in introducing new possibilities, challenging long-held assumptions, updating mental models, shared understanding and often becomes the basis for strategic decision-making (Pagani, 2009). Strategic thinking is a constant procedure that attempts to expel the ambiguities and mean a convoluted atmosphere. This process involves the examination of the circumstances and, furthermore, an imaginative blend of the outcomes as a successful strategic plan (Rahnama and Rahpeyama, 2015). Having strategic thinking is important with the end goal to envision future changes and make strategic choices (Salavati *et al.*, 2017; Steven, 2009). There are certain factors that influence the thinking process of an organisation, and a change in the behaviour of the factors will have an impact on the entire thinking process of the system (Rahnama and Rahpeyama, 2015; Moon, 2013; Benito-Ostolaza and Sanchis-Llopis, 2014; Bonn, 2005). There is a plethora of research conducted in the literature to find the effect of the factors on the thinking process of an organization (Bonn, 2005; Rahnama and Rahpeyama, 2015). In this study, a structured literature review has been carried out to identify and synthesise the factors affecting strategic thinking at an organizational level. Effect sizes of these factors in the literature were analysed to check for true homogeneity or heterogeneity. The results obtained after the analysis shows the homogeneous or heterogeneous nature of the identified factors. This analysis gives us an understanding of the level of work that has been carried out in the literature with respect to these factors and where there is a gap left for future work. Factors, which turn out to be heterogeneous, are considered for further study, as the effect of these factors on strategic thinking has been explained diversely in different studies. This study has been backed with a theory, and the constructs discussed above were adopted in the context and with the support of dynamic capabilities and resource-based view. The resource-based theory advanced and established into three streams: knowledge-based view, nature-based view and dynamic capabilities-based view (Božič and Knežević, 2016). The dynamics capabilities theory examines the sources and techniques for the creation of wealth and catches by private venture firms working in conditions of rapidly changing technology and market (Teece *et al.*, 1997; Dias and Renato, 2017). It is also proposed that private wealth creation in routines of fast innovative/technological change (TC) depends on a vast measure on sharpening interior technology, organizational and administrative procedures inside the organization (Mason, 1949; Bain, 1959; Porter, 1980; Teece *et al.*, 1997). The approach also stresses the improvement of administration abilities, authoritative, functional and technological skills. It also incorporates and attracts the research zones such as the management of R&D, item and process advancement. Meta-analysis allows researchers to aggregate evidence across studies that investigate similar theoretical predictions or sets of relationships around the same phenomenon. The aim of this study was to respond to the call for consolidation of the literature on strategic thinking and to assess the empirical support for the factors identified by cumulating prior empirical studies. However, this literature review provides agendas for improvements and suggestions for future research. Finally, based on our study, we feel confident to offer some theoretical

insights, recommendations for improving the validity and reliability of strategic thinking research, and ideas for future research.

2. Theory context characteristic methodology framework

Theory Context Characteristic Methodology (TCCM) framework used in this study helps in identifying the gaps and proposes new directions for future research. TCCM stands for theory, context, characteristics and methodology (Paul and Rosado-Serrano, 2019; Singh and Dhir, 2019). This framework is used in this study to synthesise and highlight the findings of the existing literature on strategic thinking and TC (Paul and Rosado-Serrano, 2019; Paul *et al.*, 2017; Paul and Benito, 2018). The framework helps in identifying the studies related to the three domains and gives us a consolidated view of each study (Gao *et al.*, 2019; Kahiya, 2019; Hao *et al.*, 2019; Kuo *et al.*, 2019; Paul, 2019). It also helps us to study the theoretical phenomenon with respect to different contexts, methodologies and identify the research gaps. The first part of this literature review in the form of tables will explain the studies identified using a TCCM framework.

2.1 Theory development

Strategic thinking is based on the principle of systems thinking (Senge, 1990), which states that any problem that surfaces in a system, instead of addressing in its own silo, it should be dealt by considering all the possible factors by which the behaviour of the system is being altered. Few theories have been identified from the literature review such as systems thinking (Senge, 1990), organisational theory (Drejer, 2005), technology contingency theory (Aiman-Smith and Green, 2002), managerial and organisational cognition (Bonn, 2005), adult learning theory (Casey and Goldman, 2010), critical theory (French, 2009), multi-attribute utility theory (Huang and Keskar, 2007), psychological theory (Steptoe-Warren *et al.*, 2011; Kiptoo and Mwirigi, 2014; Dhir and Mital, 2012, 2013), action theory (Larson and Hansen, 2005) and agency theory (Mitnick, 2015), which is related to the strategic thinking context and the contribution of these theories in the area of strategic thinking.

From this literature review, we also observed that most of the research that has been conducted on strategic thinking has a scarcity in the elaboration and usage of theory. Table III shows the lack of usage of theory in the studies which speak of strategic thinking. Theories give us support to understand the problem in a more structured approach, which will help the researchers to explore the uncovered areas in the field of strategic thinking. Based on these reviews and finding from the studies, it is proposed that theories such as dynamic capabilities (Teece, 1997), the resource-based view (Barney, 1991), organisational psychology (Kanfer, 1990) will help in understanding in depth the concept of strategic thinking. It is also observed that strategic thinking is explored at three levels such as the organisational, industrial and personnel; this gives the researchers to study various environments with the support of a theoretical structure. Table AII has provided generalised findings of around 60 different studies that can be used for the theory development in the area of strategic thinking.

2.2 Context

Research in strategic thinking has sophisticated our knowledge by identifying various antecedents, factors and outcomes in different contexts. However, the existing research bank has a huge variety and disintegrated from which very few interpretations can be drawn. Despite the good magnitude literature available on strategic thinking, there is still a deficiency of studies that draws conclusions and reliable findings with respect to different perspectives (Bonn, 2005). Moreover, it was identified that most of the research about strategic thinking has been conducted in countries such as USA (Millett, 1988; Weaver, 2014) and UK (Cox, 1978; Ward, 1981). Hence, this gives the researchers an opportunity to

conduct research in research on strategic thinking in the context of developing countries, which not only fills the gap but also gives an entirely different perspective of how strategic thinking works in different parts of the world.

2.3 Characteristics

Research on strategic thinking has been mostly conceptual in nature, and there were only limited studies that spoke about the empirical side of this topic. Structuring on the existing perceptions, many researchers have identified strategic thinking as a dimension, which speaks about enhancing the culture in the firm, and many gaps have been left unattended about the practical implication of this concept (Goldman, 2012). To address this knowledge gap, the future streak of studies in the area of strategic thinking should concentrate on exploring the areas, which will fill the unexplored characteristics. Cross comparison studies between firms of different countries may give different insights and thus adding information to the database.

Few studies have been conducted to identify the antecedents of strategic thinking and (Bonn, 2005), still, there is a huge opportunity for the researchers to develop more antecedents considering various contexts. Similarly, antecedents for strategic thinking can be developed at multiple levels such as personnel, organisational and industrial. The outcomes of strategic thinking have concentrated on the enhanced performance of the firm in many studies (Bonn, 2005; Moon, 2013). This can be seen as a gap for further research exploring various other outcomes.

2.4 Methodology

From the literature review conducted, it is shown that most of the studies on strategic thinking have been on developing conceptual frameworks, and limited literature has been empirical in nature. From the survey, we could identify only 44 empirical studies that were considered to conduct the meta-analysis and the rest were conceptual frameworks and case studies. Methodologies, such as regression analysis (Haans *et al.*, 2016; Mark *et al.*, 2008), correlation analysis (Aiman-Smith and Green, 2002; Coeurderoy *et al.*, 2014; Ibrahim Olaniyi and Elumah Lucas, 2016; Al-Qatamin and Esam, 2018; Dhir and Dhir, 2015, 2017, 2018), structural equation modelling (Moon, 2010; Hamed *et al.*, 2015; Arayesh *et al.*, 2017), confirmatory factor analysis (Shahbazzadeh *et al.*, 2016), analytical hierarchy process (Huang and Keskar, 2007) and content analysis (Cooper, 2012). These were the widely used methodologies in the studies from the area of strategic thinking.

The challenge is to develop more sophisticated mixed approaches where strategic thinking can be studied for various antecedents and outcomes. When narrowed down to the empirical part of the literature, it was identified that most of the studies have adopted regression and correlation for analysing the statistics obtained. This calls for a recommendation to the researcher to develop more diverse analytical techniques such as content analysis, system dynamics (Shaik and Rodrigues, 2018), analytical hierarchy process, total interpretive structural modelling (Sushil, 2017), path analysis, structural equation modelling and also non-parametric tests and multilevel methodologies. Measures used to weight the factors of strategic thinking can also be developed in a concise format, which will help the researchers to collect statistics easily.

3. Literature review and hypothesis development

The literature review has been presented using two different methods, namely, the TCCM framework and meta-analysis. The second part of the literature review explains the different factors identified for strategic thinking and technological change (TC). It also explains how the effect sizes of the factors across the literature decided the homogeneous or

heterogeneous nature. Strategic thinking, as defined in the literature, is affected by certain factors, which are categorised into various categories. In this study, we categorised the factors identified into five different categories, namely, organisational structure (OS), organisational competencies (OR), organisational culture (OC), TC and external factors (EF). The above constructs were identified for strategic thinking at an organisational level, and all the constructs that have an impact on the strategic thinking of a firm at an organisational level have been considered in the study. As the literature on strategic thinking is very scant, all the studies were thoroughly synthesised for identifying the factors; this reduced the chance of omitting any factors out of the study during the analysis. Also, there are many other constructs that affect the strategic thinking in an organisation, such as the personality traits of top management personnel, psychological traits of CEO, industrial constructs, which are at a personnel and industrial level and hence falling out of the scope of this study and can be explored as a further research agenda on strategic thinking. The literature review in this study explains how the factors categorised have an effect on the strategic thinking process of the organization.

Further, the literature review explains the factors identified for strategic thinking and what are the diverse views about these factors in nature.

3.1 Organisational structure and strategic thinking

The OS as a construct has different factors influencing it; a few among them such as centralisation, formalisation and interdepartmental teams have been considered in the study. Centralisation alludes to how much power is differentially disseminated inside an organisation (Schminke *et al.*, 2000). Organisational centralisation can be conceptualised as a continuum. In profoundly concentrated organisations, control is practiced by not many individuals (Tata and Prasad, 2004). Centralisation debilitates objectivity by setting a large portion of basic leadership on top officials, exhausting their intellectual abilities and forcing huge time requirements on them. It might, along these lines, block analysis and planning (Mintzberg, 1973; Schwenk, 1984). In centralised organisational structures, coordination and issues happen at more elevated amounts of the pecking order. Groups will be unable to perceive issues, as they happen because of their restricted comprehension of the process, and by the time when employees perceive issues, they do not have the authority to remedy them without administration endorsement (Tata and Prasad, 2004). So, there has been a view of how centralisation affects the OS and thus impacting the strategic thinking of the organisation. Based on the views obtained from the able studies, a null hypothesis is generated to check the homogeneity of effect sizes in the above studies:

H1. Centralisation has true homogeneity in effect sizes among the studies.

Formalisation is characterised as the degree to which formal and unequivocal rules characterise the jobs, duties, standards, systems and executional measures. Formalisation elucidates jobs and duties, in this way engaging aggregate activity inside organisations (Michael and James, 2000). In a client-oriented administration firm, employees must have the capacity to adjust and react rapidly to client needs. For this to happen, it is suitable for administration firms to lessen their dependence on inflexible guidelines and cultivate a situation in which contact representatives trust they are not continually observed (Jaworski, 1988; Michael and James, 2000). A highly structured environment suppresses the ability of employees to respond to customer concerns. High formalisation, by and large, directs that employees should initially look for the contribution of administration before following up on client concerns or demands (Bowen and Lawler, 1992; Michael and James, 2000). So, there has been a divergent view in the literature of how formalisation can affect the OS of the organisation, intern having an effect on the strategic thinking process of the organization:

H2. Formalisation has true homogeneity in effect sizes among the studies.

Interdepartmental cooperation portrays the trading of statistics and the coordination of exercises crosswise over interdepartmental units (Eisenhardt and Tabrizi, 1995). It expands firms' innovation performance, as it encourages information trade, upgrades the quantity of conceivably helpful thoughts, builds adaptability of the workforce and enhances practical execution of new items exhibits that functional performance which is contrarily identified with a market introduction. Accordingly, to support the age of resourcefulness and imagination from every individual representative, interdepartmental teams or groups ought to be masterminded (Moon, 2013):

H3. Interdepartmental teams have true homogeneity in effect sizes among the studies.

3.2 Organisational competencies and strategic thinking

From the skyline of resources and competencies, competitive advantage results from the use of assets and capacities to produce differential fulfilment in gainful markets (Rahnama and Rahpeyama, 2015). The reason for a competitive advantage frequently lies in the resources and competencies that are as of now available. The organization's orientation towards the market is always connected with advancement and competitiveness (Kohli and Jaworski, 1990; Rahnama and Rahpeyama, 2015). Strategic thinking is the premise of improvement in the business of today and is reliable with social changes, technological accomplishments and the requests of creating focussed situations. Advancement of an association does only not rely upon executives, their choices and considerations, but also rather rely upon their specialised, human and perceptual abilities (Smith, 2002; Hosseini, 2007; Rahnama and Rahpeyama, 2015). Firms with high mechanical competency will probably actualise fundamentally new product developments (NPD). Hence, the findings from the literature strongly comment on the importance of the OR and their role in the thinking process:

H4. Market competency has true homogeneity in effect sizes among the studies.

H5. Technological competency has true homogeneity in effect sizes among the studies.

3.3 External factors of strategic thinking

Environmental (market and technological) turbulence has an activating job on the versatile administration hones in associations. In particular, the literature shows that environmental turbulence gives minimal dependable statistics, prompting "causal-ambiguity" (Celly and Frazier, 1996). At the point when the environmental condition turns out to be more violent, and accordingly less unsurprising, organisations change their practices, procedures and schedules to address the difficulties by adjusting organisations practices and systems. Rapidly changing markets and advances require instant reactions and quick conclusive moves for firms to make the preferred standpoint of external opportunities. Taking into account, the idea of strategic thinking is the management of chaotic complexities and multifaceted nature. Environmental turbulences are probably going to be important factors of thinking (Moon, 2013; Rahnama and Rahpeyama, 2015). It also inferred from the literature that organisations with better technological and market orientation fall on the positive side of the decision-making with respect to handling the environmental disturbances:

H6. Market turbulence has true homogeneity in effect sizes among the studies.

H7. Technological turbulence has true homogeneity in effect sizes among the studies.

Environmental dynamism concerns impacts on firm procedures and execution originating from sources outer to the firm, for example, market and technological dynamics Hosseini (2007). Organisation adopting strategies that underscore product/market transformation, which is related to high environmental dynamism, depend all the

more emphatically on tight budget objectives. Environmental dynamism can likewise be relied upon to influence firms' use of statistics hotspots for target setting. Specifically, past execution statistics will be most instructive for the target setting when environmental dynamism is low (Chenhall, 2003; Gupta and Govindarajan, 1984). Uncertainty, change or intensity ought to be comprehensively deciphered as the level of low stability, and advancement of the innovation is associated with firms' production and distribution forms (González-Benito *et al.*, 2014). So, the dynamism outside the firm has an impact on the activities and processes inside the firm which may have an effect on the strategic thinking of the system:

H8. Environmental dynamism has true homogeneity in effect sizes among the studies.

3.4 Organisational culture and strategic thinking

Strategic conformity is the degree to which an organisations system adheres to the central propensities of its industry (Finkelstein and Hambrick, 1990; Stewart and Eden, 2006). In firms whose strategies adjust to their enterprises' central tendencies, the basic abilities for successors are recognition with those industries' systems and practices (Kaufmann and Gupta, 1988; Zhang and Rajagopalan, 2003). Firms with novel and one of a kind systems that veer off from industry inclinations will probably want successors who can investigate and assess the scope of aggressive practices beyond those that most firms in their enterprises have officially embraced (Finkelstein and Hambrick, 1990; Zhang and Rajagopalan, 2003). Firms' expectation on accomplishing competitive strength have a strategically forceful culture (Hamel *et al.*, 1989; Hamel and Prahalad, 1994). A strategically aggressive culture infers that all in the organisation comprehend that endeavours to win intensely, excel and rule markets are ceaseless (Venkatraman, 1989). Strategic aggressiveness states that the organization is yearning with respect to development and matchless quality in its business sectors, dedicating every conceivable asset and working in all conceivable approaches to achieve the targets and strategic goals (Hamel *et al.*, 1989; Hamel and Prahalad, 1994). Researchers in the literature have defined strategic flexibility as the ability of the firm to digest the strategic changes over a period of time (Evans, 1991; Harrigan, 1985). Strategic flexibility mirrors an organisations capacity to react constantly to unforeseen changes and to acclimate to sudden outcomes of unsurprising changes (Nadkarni and Herrmann, 2010). Organisations that are more arranged towards the market do not accomplish an enhancement in performance, as opposed to the individuals who have more strategic flexibility (Jose and Antonio, 2005). The reward and remuneration framework is a basic factor of OC, as it can either energise or obstruct representatives' activities (Hambrick and Snow, 1989). Reward frameworks are a basic piece of any association's structure. How well they fit with whatever remains of the frameworks in an association importantly affects how viable the association is and on the personal satisfaction that an individual's involvement in the association. (Bonn, 2005) A reward framework that incorporates long haul, and executive performance of official execution can lead the association to accomplish its vital goals because of its impact on official conduct. The above factors are considered to have an effect on the OC with respect to time, and a change in the above parameters can have an impact on the strategic thinking of the organization:

H9. Strategic conformity has true homogeneity in effect sizes among the studies.

H10. Strategic aggressiveness has true homogeneity in effect sizes among the studies.

H11. Strategic flexibility has true homogeneity in effect sizes among the studies.

H12. CEO emphasis has true homogeneity in effect sizes among the studies.

H13. Reward system has true homogeneity in effect sizes among the studies.

3.5 Technological change and strategic thinking

Strategic thinking is defined as the thinking process of an organisation to adapt to the changes that take place in the market and perform better by working strategically on those changes. TC is one such change which needs to be adopted by the organisation to upgrade their way of business. TC can be categorised, and each category has its own set of factors that influence the technology change in the organisation (Majharul and Talukder, 2012). R&D intensity is one such factor that majorly impacts the TC in an organisation (Pilar *et al.*, 2009), which has an influence on the strategic thinking of the organisation. Prior research reveals that R&D investment is a fundamental influence on competitiveness and national development (Conner, 1991; Tidd, 2001) and may result in superior performance and growth. R&D spending has a favourable and significant impact on the growth of the firm's productivity (Wakelin, 2001) and long-term performance. R&D intensity helps in better support of firms' relationships with external partners to keep ahead of competency and market, hence, improving firm performance. Hence, R&D intensity has a significant impact on firm performance. From the above discussion, it is clear that R&D intensity has an impact on strategic thinking and firm performance (Tidd, 2001; Miller *et al.*, 2009). Further extending this study, we tried to analyse the mediating effect if strategic thinking between R&D intensity and firm performance to better understand how the thinking process may help in investing more in R&D with enhances the performance of the firm. Technology novelty refers to the newness of the technology embodied in the new service. Technological novelty creates inefficiencies in the development process because tasks are less straightforward and are non-routine (Montoya-Weiss *et al.*, 2001). When the technology newness is high, there is an impact on the managers' thinking process on how to implement that in the operational process (Carbonell *et al.*, 2009; Pilar *et al.*, 2009; Masaki *et al.*, 1996). So, technology novelty has a considerable effect on the strategic thinking of the organisation. Technology novelty gives the aggregate sense of the organisations' technology (Tathikoda and Rosenthal, 2000) and helps in understanding the processes of simplifying the operationalisation using new technologies. Studies have also shown that more the newness in the technology, more the complex it is to accommodate in the operational processes of the organisation and thus having an impact on the performance of the organisation. Although the cumulative effects of incremental changes may be important, individual advances are almost invisible because their effects are so small (Hollander, 1965). So we hypothesise that, from the diverse literature on TC and strategic thinking, it can be inferred that technological novelty has an influence on the thinking process and the performance of the firm (Montoya-Weiss *et al.*, 2001; Tathikoda and Rosenthal, 2000). As another extension of this, we intend to understand the mediating effect of strategic thinking between technology novelty and firm performance. Technology adoption lag is defined as the product development team's lag or time taken to make new technology know-how fully available in place of a required or existing know-how prior to the prototype design stage in a new high-tech product development process (Saji and Mishra, 2012). Existing technologies often fall short of fulfilling desired requirements to achieve highly competitive new high-tech products (Krishnan and Bhattacharya, 2002). Hence, leading to a lag in the adoption of newer technologies. So, TCs lead to a lag in the adoption of new technologies in the organisation which requires an intensive evaluation process thus influencing the thinking of the organisation. Firms that introduce a higher number of new technologies in their NPD projects tend to be more successful in their new product commercialisation efforts. Dynamic customer needs and intense competition, which always make the firm follow an upward trajectory on performance parameters (Bhattacharya *et al.*, 1998; Mohr, 2001). Lesser the lag sooner the technology is adopted and sooner the operational efficiency of the firm increases leading to better firm performance. Managers handling the technological aspects in the organisation should be mentally prepared for the changes to take place in the organisations' operational processes and should strategically plan well in advance for such situations (Saji and Mishra, 2012). Therefore, strategic thinking plays a mediating role to understand the importance of technology adoption speed and how it has an influence on firm performance:

H14. R&D intensity has true homogeneity in effect sizes among the studies.

H15. Technological novelty has true homogeneity in effect sizes among the studies.

H16. Technology adaption lag has true homogeneity in effect sizes among the studies.

4. Methodology

A structured literature review method has been adopted to identify and synthesise the factors (Saritas and Oner, 2004; Rigby *et al.*, 2017) that are affecting the strategic thinking of an organisation. To synthesise the identified factors, meta-analysis is conducted on the factors from papers identified in ABDC ranked journals of the strategic management area. The papers were searched with keywords such as strategic thinking, strategic intelligence, thinking strategically, antecedents of strategic thinking and factors of strategic thinking. A total of 65 papers were identified out of which 20 turned out to be conceptual papers and 45 were empirical papers. Factors common in at least two papers were considered, as the factors studied in a single paper cannot be synthesised using meta-analysis. Factors that are identified for synthesising using the meta-analysis tools are centralisation, formalisation, interdepartmental teams, market competency, technological competency, market turbulence, technological turbulence, environmental dynamism, strategic conformity, strategic aggressiveness, strategic flexibility, R&D intensity, technological novelty, technological adoption lag and CEO emphasis.

Meta-analysis technique (Schmidt and Hunter, 2014; Eddine *et al.*, 2015; Lee and Jung, 2016; Farley and Lehmann, 2001; Khlif and Souissi, 2010; Cadeaux and Ng, 2012; Matarazzo and Nijkamp, 1997) was adopted for quantitatively analysing the 45 empirical studies. This technique helps in analysing the effect sizes of the factors from the studies considered (Saxena, 2018; James and Teichler, 2014; Jafari *et al.*, 2019; Voros, 2009). There are two types of effect sizes, random effect and fixed effect. The difference between fixed and random effect meta-analysis technique is that fixed-effect meta-analysis assumes effect size to be homogenous, as studies included in the meta-analysis are believed to be sampled from the same population. Whereas in the case of random-effect meta-analysis, the effect size is assumed to be random, as the studies included in the meta-analysis are sampled from a super population. In this study, a fixed-effect meta-analysis is conducted to check the effect sizes of the studies. Comprehensive meta-analysis software is the tool used to generate the effect sizes of the studies. All the studies considered in the literature review have correlation analysis as common methodology, the values of which acts as the input to the tool for generating the effect sizes. Hedges g test (Powers *et al.*, 2008) is conducted for the studies, individually for every factor. The analysed effect sizes and standard errors help in identifying the homogeneous or heterogeneous nature of the factor. This is carried out by calculating the q statistics (Lipsey and Wilson, 2001; Julian and Thompson, 2002). The null hypothesis generated quotes that there is true homogeneity in effect sizes among the studies and the alternative hypothesis states that there is heterogeneity. Q statistics is distributed as χ^2 with $(k-1)$ degrees of freedom, where k is the number of samples per factor. $Q = \sum(W*ES^2) - \frac{\sum(W*ES)^2}{\sum W} \sim \chi^2_{(k-1)}$

where, W = relative weight and ES = effect size. Q -stats has low power as a comprehensive test of heterogeneity, especially when the number of studies is small (Julian and Thompson, 2002). Hence, this test is weak at detecting the heterogeneous nature of the factor. As an alternate, I^2 test (Lam ris *et al.*, 2008) is calculated that describes the per cent of variation across studies that is because of heterogeneity rather than chance (Higgins *et al.*, 2001). $I^2 = \left(\frac{Q - (K-1)}{Q * 100}\right)$. The I^2 value has levels of interpretation, such as $I^2 = 0$ per cent, there is no heterogeneity, $I^2 = 25$ per cent there is low heterogeneity, $I^2 = 60$ per cent there is moderate heterogeneity, $I^2 = 80$ per cent and above; there is very high heterogeneity and if I^2 is negative, it is considered to be as good, as 0 and I^2 can never reach 100 per cent. The entire procedure explained above has been adopted to synthesise the factors affecting

strategic thinking and to identify the true homogeneity and heterogeneity of these factors among the empirical studies considered from the literature.

4.1 Survey of literature

We have conducted a structured and comprehensive literature review on strategic thinking including both theoretical and empirical work. First, keywords for strategic thinking such as “strategic thinking”, “thinking strategically”, “antecedents of strategic thinking”, “factors of strategic thinking”, “strategic intelligence”, “strategic planning”, “thinking”, “TC”, “change in technology”, “factors of TC”, “organisational factors of strategic thinking”, “strategic thinking and firm performance” and “factors of thinking and performance” were used for a computerised search. The databases used for this search were EBSCO host and Scopus. The timeline of the search was kept to be 1978-2018 for theoretical papers, and empirical papers were extracted from the timeline of 2000-2018. The downloaded papers were then classified according to the ABDC category of journals. Finally, the complete database of literature for strategic thinking was categorised into theoretical and empirical papers. A total of 65 papers were considered out of which 45 were empirical and 20 were conceptual.

4.2 Criteria of inclusion

As explained in the survey of the literature, a total of 45 empirical papers were considered for the meta-analysis. The papers were considered based on three different criteria for conducting the meta-analysis. First, we considered studies that have their dependent variable as strategic thinking, OS, culture, resources, and TC. As it was inferred from the literature, the factors falling in the above categories have an impact on the strategic thinking of an organisation (Bonn, 2005). Second, we have included papers that have spoken about strategic thinking at an organisational level and omitted the papers which have analysed the strategic thinking at an individual level which comprises psychological traits of the individual to the top management executives. Finally, all the papers included in the analysis had the type of methodology used in the work as common. Meta-analysis can be conducted for means, variances, regression, correlation, etc. In our study, we kept correlation analysis as a standard for all the papers.

4.3 Coding procedure

As explained in the above section, the papers with correlation analysis were considered for the meta-analysis. As the main aim of the study was to check the true homogeneity of the factors listed from the literature, Q statistic was calculated for all 16 factors listed from the literature. First, the sample size for each factor from k (k = total number of papers) papers was listed and tabulated. Second, the correlation constant of the factor and the dependent variable was tabulated again from k number of papers. As explained in the methodology section, the required values for calculating the Q statistics were calculated from the sample size and correlation values. Finally, the Q statistics is calculated for all 16 factors individually and tabulated. The calculated Q statistics are compared to the tabulated Q statistic from the chi-square table. Calculated Q values that are smaller than the tabulated Q values were inferred to be homogeneous, remaining were again tested for the nature of heterogeneity using the I^2 values. The entire procedure was adopted from the work explained in (Hunter and Schmidt, 2004).

5. Results and analysis

Using the comprehensive meta-analysis tool the effect sizes and standard errors for all the empirical studies have been calculated by Hedges g test. The Q statistics for every factor is calculated and compared to the tabulated Q statistics from the chi-square table. If the calculated q statistics is less than the tabulated Q the factor is considered to be

homogenous, if it is greater than the tabulated Q value the hypothesis is not accepted and the factor is further tested for heterogeneity. As per the analysis the factors considered under OS; centralisation, formalisation, and interdepartmental teams were tested for effect sizes. It was found that centralisation and formalisation are not homogeneous, and this shows that the empirical studies considered for the analysis had a different view on the impact of these factors on strategic thinking. Whereas interdepartmental teams have true homogeneity among all the studies from the effect sizes obtained. This shows that literature on centralisation and formalisation has different views on how they have an impact on the strategic thinking of the organisation. Factors of organisational competencies, technological and market competency when tested for true homogeneity, the effect sizes obtained from the analysis showed that the studies considered for these factors have a similar opinion on the type of impact on strategic thinking. So, the hypothesis is accepted and the factors were interpreted to be homogenous in nature. Factors grouped under OC; strategic conformity and reward system when tested for homogeneity it was found that there was true homogeneity among the effect sizes, and the empirical studies considered for the analysis have similar views on how these factors have an impact on the strategic thinking of the organisation. Whereas other factors listed under OC; strategic flexibility, strategic aggressiveness and CEO emphasis when tested for true homogeneity in the effect sizes showed a heterogeneous nature. It was inferred that these three factors have been discussed with different perspectives on how they affect the strategic thinking of an organisation and based on the I^2 values, it shows that there is very high heterogeneity in the effect sizes among the studies considered. TC factors considered for the analysis such as R&D intensity and technology adoption lag when synthesised showed that their effect sizes had no true homogeneity among the effect sizes and also there is a very heterogeneity among the nature of the studies. Technological novelty, on the other hand, falling under the same category had a true homogeneity in the effect sizes for the studies considered. EF identified; market and technological turbulence, which are basically considered as the control variables in the study, had a highly heterogeneous nature among the effect sizes for the studies considered for the study. The summary of the analysis has been tabulated for all the 16 factors considered from the empirical studies in the literature (Table I).

The analysis, as shown in the above table, infers that out of 16 factors considered for the analysis, 6 are homogeneous and 10 are heterogeneous. Out of 16 hypotheses generated, 6 were accepted and 10 were not accepted, which states that there is true homogeneity in only 6 factors that affect the strategic thinking, and the remaining 10 factors have been explained diversely in the literature.

Table I Meta-analysis results

| Sl. No. | Factors | WC | K | N | W | Effect size | Std error | Q Stats | Q Tab | Hypothesis result | I^2 |
|---------|--------------------------|--------|---|------|---------|-------------|-----------|---------|-------|-------------------|-------|
| 1 | Centralisation | -0.01 | 5 | 487 | 112.99 | 0.46 | 1.11 | 21.7 | 9.49 | Not accepted | 81.56 |
| 2 | Formalisation | 0.42 | 4 | 985 | 200.36 | 2.94 | 0.69 | 82.09 | 5.99 | Not accepted | 96.35 |
| 3 | Market competency | 0.09 | 2 | 683 | 166.51 | 0.78 | 0.42 | 2.74 | 9.59 | Accepted | |
| 4 | Technological competency | 0.09 | 7 | 2361 | 581.57 | 1.35 | 0.95 | 4.74 | 11.07 | Accepted | |
| 5 | Market turbulence | 0.28 | 2 | 377 | 86.24 | 1.16 | 0.31 | 14.52 | 3.84 | Not accepted | 93.11 |
| 6 | Technological turbulence | 0.39 | 2 | 377 | 86.78 | 1.13 | 0.31 | 12.75 | 3.84 | Not accepted | 92.16 |
| 7 | Environmental dynamism | 0.37 | 2 | 548 | 115.99 | 1.85 | 0.28 | 34.99 | 3.84 | Not accepted | 97.14 |
| 8 | Strategic conformity | 0.13 | 2 | 283 | 68.74 | 0.52 | 0.37 | 3.07 | 3.84 | accepted | |
| 9 | Strategic aggressiveness | 0.34 | 2 | 3606 | 799.12 | 1.67 | 0.2 | 352.69 | 3.84 | Not accepted | 99.72 |
| 10 | Strategic flexibility | -0.19 | 2 | 973 | 224.56 | -0.11 | 0.23 | 52.83 | 3.84 | Not accepted | 98.11 |
| 11 | R&D intensity | 0.0816 | 3 | 6964 | 1728.19 | 0.5417 | 0.2164 | 12.47 | 3.841 | Not accepted | 83.96 |
| 12 | Technological novelty | 0.15 | 2 | 222 | 53.42 | 0.62 | 0.39 | 2.75 | 3.84 | Accepted | |
| 13 | Technology adoption lag | 0.10 | 2 | 806 | 186.95 | 0.91 | 0.23 | 39.4 | 3.84 | Not accepted | 97.46 |
| 14 | Interdepartmental teams | 0.15 | 2 | 367 | 88.29 | 0.18 | 0.3 | 0.39 | 3.84 | Accepted | |
| 15 | CEO emphasis | 0.17 | 3 | 367 | 87.7 | 0.76 | 0.31 | 7.52 | 3.84 | Not accepted | 86.70 |
| 16 | Reward system | 0.14 | 2 | 367 | 4079 | 0.55 | 0.05 | 1.60 | 3.84 | Accepted | |

6. Discussions and implications

From the analysis, it is inferred that a set of six factors (market competency, technological competency, strategic conformity, technological novelty, interdepartmental teams, reward system) are homogenous and a set of ten factors (centralisation, formalisation, market turbulence, technological turbulence, environmental dynamism, strategic aggressiveness, strategic flexibility, R&D intensity, technology adoption lag and CEO emphasis) are heterogeneous. This study showed that there is a gap to be answered in the strategic thinking literature on why and how there is a heterogeneity or diverse views on the above 10 factors and what role/effect do they have in achieving the strategic thinking in an organisation. This study also quantitatively validates the literature review conducted on the factors affecting strategic thinking, which gives us a mathematically proven backing for dropping a few factors for the future studies on strategic thinking. The above findings also provide a solid foundation and interesting insights for future research in this area of strategic thinking.

6.1 Academic implications

This study adds to the literature of strategic thinking and the factors having an impact on strategic thinking at an organisational level. This study also identifies the gap from the findings which explain the homogeneous and heterogeneous nature of the factors. As there is enough work done on the homogeneous factors, there is a scope for the researchers to further explore the factors which have a heterogeneous nature. The study also contributes to the literature by explaining how strategic thinking has been evolved over a period of time.

6.2 Implications for industries and policymakers

The findings of this study give an understanding of what are the factors that affect the strategic thinking in an organisation. The study includes factors, such as R&D intensity, technology adoption lag, flexibility, strategic aggressiveness, which are to be prioritised when the strategies are designed. These are the focal points that may bring a strategic thinking environment in the organisation which leads to better firm performance. Policymakers, on the other hand, need to understand the behaviour of these variables in different scenarios which might give them a proper understanding of how the policies framed might have an impact on the industry. This helps to prevent the failures in the policy or any negative effect on the performance of the industry which may have a direct effect on the growth of the country with respect to that industry.

7. Directions for future research

We have run the meta-analysis and provided an analytic estimate of the factors affecting strategic thinking at an organisational level. This review of strategic thinking literature for the timeline of around 30 years gives a theoretical insight of the current status of this domain and also helped us to identify certain gaps in the current knowledge of thinking literature and hence put ahead research agenda for the future. As a take away from this literature review, we have tried to identify a few gaps and defined a few frameworks for further research in the area of strategic thinking.

7.1 Framework 1

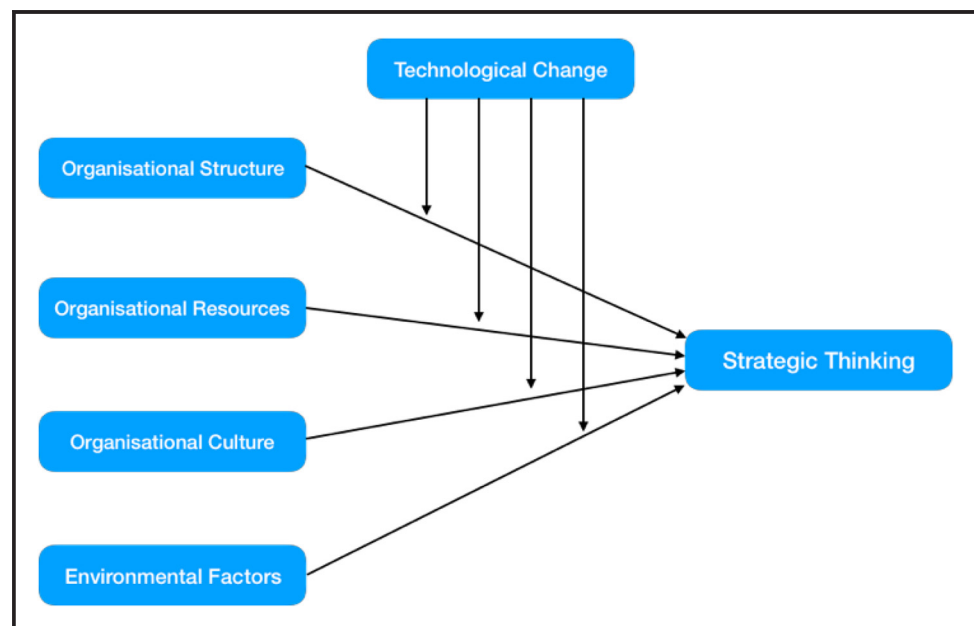
The first framework we propose is to check the effect of the constructs OS, OR, OC, EF on strategic thinking and the moderating effect of TC between these constructs and strategic thinking. Our initial survey on studies concentrated more on strategic planning and strategic thinking in their own silos. TC is an essential business process that needs to be considered while framing a strategy. Owing to the change in the technologies, there might be certain disturbances which take place in the organisation. These dynamics may take place in any one of the four constructs, or it can affect all the constructs and their impact on strategic thinking.

So the proposed model can be tested with and without the moderation effect of TC, and the values obtained can be compared and findings can be drawn from the results. Future study on this framework also gives us an understanding of the magnitude of effect, owing to TC in an organisation and its impact on the thinking process. Apart from the factors synthesised for this study, there are many other technological factors such as technology heterogeneity, technology intensity, technical complexity and technical reliability that may also be considered while testing the model. There is very scant literature on how technology change as a moderator has an effect on the thinking process in an organisation. These are key gaps in our current knowledge that are in site need of research. The meta-analysis carried out on these factors can act as support for the future development of a more clear conceptual model that can be tested when statistics for the listed factors becomes available. This framework has the advantage that it will allow the integration of various findings with different insights (Figure 1).

7.2 Framework 2

As a second theme for future research, we propose that further research on strategic thinking should test the mediating effect of technological change between constructs and strategic thinking. As explained earlier, TC acts as one of the major business processes which have a great impact on the functional aspects of the organisation. Only recently researchers have started to pay attention to various dynamics these constructs cause while developing a strategic thinking culture in the organisation. TC is one of the important constructs when considered for the role of a mediator might have a different effect on the behaviour of strategic thinking with might be interesting to study both from academic as well as industrial point of view. A perspective on TC as a mediator should involve a researcher's effort of how to delineate its effect of the constructs on strategic thinking. An examination of such an effect should also give us an extensive conceptualisation of how important can the role of TC is in an organisation to develop the culture of strategic thinking. Thus, as indicated in the conceptual model, research should push the envelope further and take a closer look at the mediating effect of TC between constructs and strategic thinking. The findings derived from testing this model can help us understand the magnitude of the effect of TC on strategic thinking. This also helps the top

Figure 1 Conceptual framework with TC as a moderator



management teams to understand the dynamics that are placed in different functional departments because of the adoption of new technologies in their organisation, which also helps in detecting the failures beforehand which have an adverse impact on the efficiency and performance of the business (Figure 2).

7.3 Framework 3

Finally, as a third-board research avenue, we suggest that future research should benefit from considering the impact of strategic thinking on the firm performance along with the moderating effect of environmental factors and the mediating effect of strategic thinking between the constructs and firm performance. Studies till now in the literature have spoken about the various factors that have an effect on the strategic thinking of the organisation and how to develop a culture of strategic thinking in the organisation. Virtually no studies have examined the mediating effect of strategic thinking with respect to the performance of the organisation. With the interest of taking the research on strategic thinking to a step ahead, we propose this conceptual framework where the mediating effect of strategic thinking, as well as the moderating effect of the environmental factors, such as market and technological turbulence on the firm performance, can be analysed. Future research should concentrate on empirically studying the different dynamics in an organisation owing to strategic thinking and should be able to answer multilevel questions regarding the same. The findings from this framework explain how organisations practicing strategic thinking differ from, those not, by showing a better behaviour in terms of firm performance. Also by studying the moderating effect of environmental factors, gives the top management teams to understand of how the EF can affect the performance of the organisation and was measures in the form of strategies that can be framed to prevent a fall in the performance. This conceptual model can be further extended to identify the causal loops which might give insights on how the change in the behaviour of a particular construct can have an effect on the entire system. Future research may integrate and test the behaviour of these factors to understand their contribution in achieving strategic thinking in the system (Figure 3).

8. Conclusion

The meta-analysis conducted in this study provides a comprehensive picture of the factors affecting the strategic thinking of an organisation. In the past studies from literature, strategic thinking has been explored conceptually, and the factors affecting strategic thinking were studied in their own silos with respect to other dependent variables (Bonn, 2005; Moon, 2013). It

Figure 2 Conceptual framework with TC as a mediator

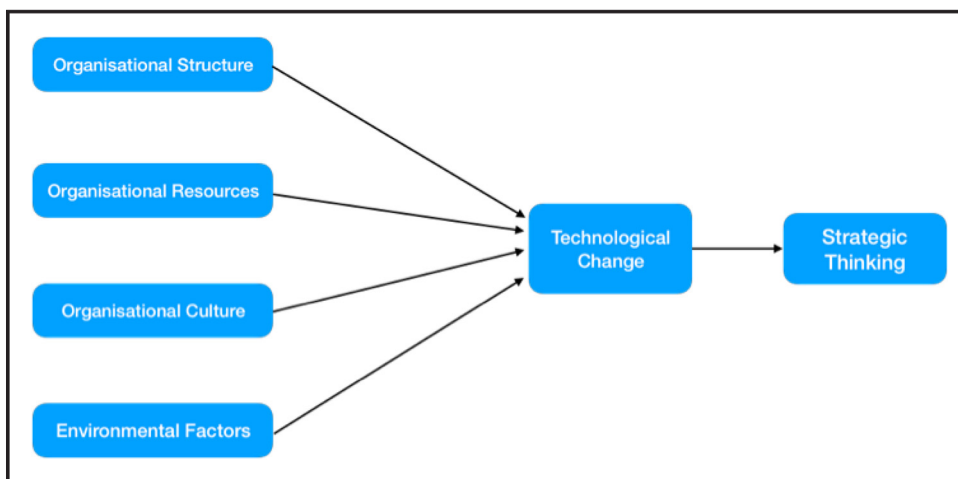
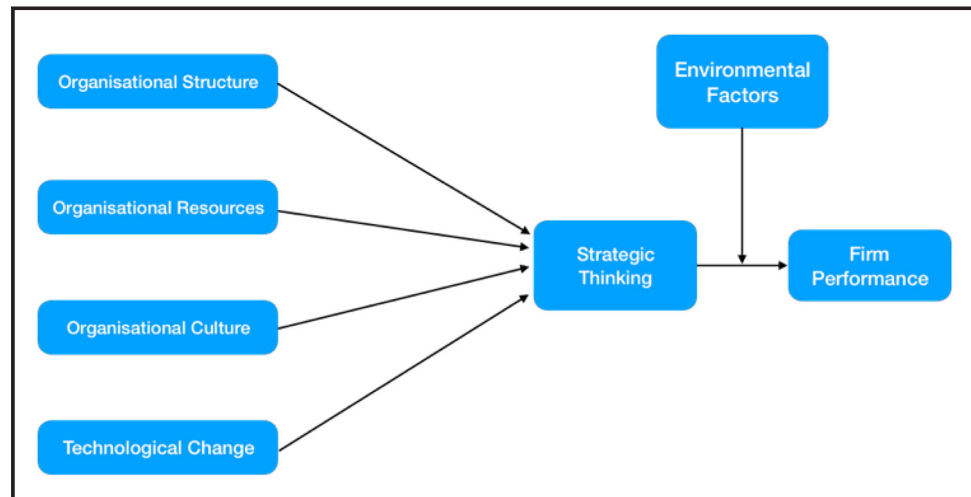


Figure 3 Conceptual framework with environmental factors as a moderator for firm performance



was also inferred from few studies that strategic thinking has an impact on the market performance of the firm (Rahnama and Rahpeyama, 2015). Studies have also analysed how OC and OS individually have an impact on the strategic thinking of the firm (Goldman, 2012; Mintzberg, 1973; Schwenk, 1984; Schminke *et al.*, 2000). TC has also been exploring in terms of how it has an influence in adopting newer technologies in the firms and how this leads to a better performance (Teece *et al.*, 1997; Dias and Renato, 2017). All the above studies were amalgamated for their findings and the effect sizes for all these studies were analysed to identify the scope for working on the constructs that have mixed interpretations in the literature. This study identified such factors by analysing the homogeneous and heterogeneous nature of these factors. This study adds to the literature of strategic management in the area of strategic thinking and TC. Finally, this study provides theoretical insights into the factors affecting strategic thinking and TC at an organisational level. Future research on this area may benefit from the following:

- analysing the type of impact;
- identifying the driving power of the factors; and
- analysing the interdependencies of the factors on one another.

Hence, this study contains the essence of the past literature on strategic thinking, its factors, analyses the mixed school of thoughts of these studies and opens new agendas for the future research.

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Appendix

Table A1 Definitions of strategic thinking

| <i>Sl. No.</i> | <i>Author</i> | <i>Definition</i> |
|----------------|---|---|
| 1 | Kaufman (1991) | "Strategic thinking is defined as "practical dreaming" in the way in which people in an organization assess, view, and create the future for themselves and their associates by defining and envisioning results that add value." |
| 2 | Mintzberg (1994) | "Strategic thinking is a distinct way of thinking that utilizes intuition and creativity with the outcome being "an integrated perspective of the enterprise". |
| 3 | Hamel and Prahalad (1994) | "Strategic thinking is the attitude of an organisational thinking process which drives smart actions and the will to inspire the entire firm to work towards a goal". |
| 4 | Raimond (1996) | "Strategic thinking is the ability to synthesise and utilise intuition and creativity in order to give an integrated perspective to an organisation". |
| 5 | Liedtka (1998) | "Strategic thinking is traditionally defined as creative, disruptive, future-focused, and experimental in nature and seen to be at odds with traditional notions of strategic planning". |
| 6 | Graetz (2002) | "Strategic thinking is defined as the efforts for innovation and imagination of the future which leads to a redefinition of basic strategies and even industrial businesses". |
| 7 | Bonn (2005) | "Strategic thinking is a way of solving strategic problems that combines a rational and convergent approach with creative and divergent thought process". |
| 8 | Drejer et al. (2005) | "Strategic thinking about possible scenarios and strategy in a creative manner that is relatively free from existing boundaries". |
| 9 | Abraham (2005) | "Strategic thinking is a cognitive approach that attempts to discover new and unconventional ways of competing". |
| 10 | Yarger (2006) | "Strategic thinking is about thoroughness and holistic thinking that seeks to understand how the parts interact to form the whole by looking at parts and relationships among the effects they have on one another in the past, present, and anticipated future". |
| 11 | O'Shannassy (2006) | "Strategic thinking is a particular way of solving strategic problems and opportunities at the individual and institutional level combining generative and rational thought processes". |
| 12 | Alsaaty (2007) | "Strategic thinking is an act of creating a whole new business venture". |
| 13 | Jelenc (2008) | "Strategic thinking is a self-reflection on an organisations' future that must be conceived as an organisational cognitive process which is performed and supported by a group through interaction and interdependence". |
| 14 | Goldman (2010) | "Strategic thinking is thinking that contributes to broad, general, overarching concepts that focus the future direction of an organization based on anticipated environmental conditions". |
| 15 | Golden (2011) | "Strategic thinking is a process that aims at improving organisational functioning through smart decision-making process". |
| 16 | Haycock et al. (2012) | "Strategic thinking is an innovative, creative, and right-brained process that encourages an open exchange of ideas and solutions to meet the dynamic, often unpredictable challenges faced in today's economy". |
| 17 | Shaheen et al. (2012) | "Strategic thinking is expressed as a process of cognition that drives strategic knowledge, learning and of knowing all the variables that develop the cognitive maps of the minds of strategists at both group and individual level and also getting an understanding of the strategic environment at local and international levels". |
| 18 | Hosseini et al. (2007) | "Strategic thinking is a process of utilizing previous experiences in a coherent framework and showing the best reaction in vital situations". |
| 19 | Kazmi and Naaranoja, (2015) | "Strategic thinking is considered a significant business process by management experts due to its appeal to strengthen organizational performance management and its effectiveness". |
| 20 | Ibrahim Olaniyi and Elumah Lucas (2016) | "Strategic thinking is seen as the generation and application of distinctive business ideas and opportunities intended to create a competitive advantage for a firm or business". |
| 21 | Ali (2016) | "Strategic Thinking is a planning process that applies innovation, strategic planning and operational planning to develop business strategies that have a greater chance for success". |
| 22 | Morteza et al. (2016) | "Strategic thinking is like a lever that paves the way for the organization to achieve improved performance". |

(continued)

Table A1

| <i>Sl. No.</i> | <i>Author</i> | <i>Definition</i> |
|----------------|-------------------------------|---|
| 23 | Aarayesh <i>et al.</i> (2017) | "Strategic thinking is a strategic capability that helps managers to understand their ability in predicting and controlling future events and distinguishing them". |
| 24 | Ahmed and Ayat (2018) | "Strategic thinking is a process that embedded the manner in which people think and rethink, evaluate, view, and conduct the future for themselves and others". |
| 25 | Sun Tzu | "Strategic Thinking is comprehensive thinking and investigation required to meet the challenge of war in the greatest concern of state". |

Table A11 TCCM

| Sl. No. | Author/year | Country | Journal | Theory | Context | Characteristics /findings | Methodology |
|---------|----------------------------------|---------|------------------------------|---------------------------|--|--|------------------|
| 1 | Cox (1978) | UK | Long Range Planning | Technology model | Framework for TC and decision making | The framework seeks to assemble, order and set down the economic and technological factors which have a bearing on decisions. | Conceptual |
| 2 | Ward (1981) | UK | Long Range Planning | | TC in organisations | This study explains the various frameworks to achieve successful TC in organisations | Case study |
| 3 | Easterby-Smith and Davies (1983) | UK | Long Range Planning | Strategic planning | Strategic planning Concepts | This paper looks at the problem of getting managers to contribute effectively to strategic planning and focuses on the role of management development approaches in ensuring that this happens | Conceptual |
| 4 | Baird and Thomas (1985) | | Academy of Management Review | Strategic risk model | Strategic risk at different levels | Different types of risks at an organisational, industrial, individual and environmental level have been explained in the form of a model. | Conceptual model |
| 5 | Quinn (1985) | UK | Long Range Planning | TC model | Identifying factors for TC | This paper reports on a study of the incidence and organizational form of monitoring of the technological environment by UK companies. | Conceptual |
| 6 | Millett (1988) | USA | Long Range Planning | Conceptual business model | Scenarios in forming business strategies | This paper has addressed the issues of how companies can use scenarios in formulating their business strategies and it concludes that the scenario process has value beyond the results for strategic thinking and management. | Conceptual |
| 7 | Zabriskie and Huellmantel (1991) | USA | Long Range Planning | Systems thinking | Development of strategic thinking in senior-level management | This study states that it is necessary to identify the substance of strategic thinking and the capabilities that must be mastered | Conceptual model |
| 8 | Langowitz (1992) | USA | Long Range Planning | | TC in organisations | This article uses the cases to illustrate contrasting strategic approaches that influence the technological transition | Case study |

(continued)

Table A11

| Sl. No. | Author/year | Country | Journal | Theory | Context | Characteristics /findings | Methodology |
|---------|--------------------------|---------|-------------------------------------|---|---|---|-------------|
| 9 | Bates and Dillard (1993) | | <i>Long Range Planning</i> | Interfunctional Multi-planning approach | Cross-functional strategic teams and CEO's | A firm's strategic planning can be improved with the inter-functional multi-planning (IMP) design. IMP relies on a strategic planning group comprised of the firm's premier strategic thinkers regardless of their level in the management hierarchy or function in the firm. | Case study |
| 10 | Simon (1993) | USA | <i>Strategic Management Journal</i> | Systems thinking | Strategic thinking to achieve competitive advantage | This paper explains that strategic planning is aimed at dealing with the enormous uncertainty and constant change that modern organizations find in the environments to which they must adapt | Conceptual |
| 11 | Raimond (1996) | UK | <i>Long Range Planning</i> | Systems thinking | Eastern vs Western strategic thinking | This paper describes how thinking should be updated by forecasting the future of the business. Hence creating a new business and corporate strategies to sustain the same. | Conceptual |
| 12 | Liedtka (1998) | UK | <i>Long Range Planning</i> | Systems thinking | Rise of Strategic thinking | This article argues for a view of the planning process as a catalyst for a developmental dialogue, broadly inclusive of an organization's managers and open to their views. | Conceptual |
| 13 | Clarke and Varma (1999) | UK | <i>Long Range Planning</i> | Risk management model | Risk management in strategic business process | While most companies now see risk as a key strategic issue, the risk is typically still treated tactically and piecemeal. In this article, the authors argue that an integrated risk management approach allows companies to consistently deliver superior performance while proactively managing risks | Conceptual |

(continued)

Table All

| Sl. No. | Author/year | Country | Journal | Theory | Context | Characteristics /findings | Methodology |
|---------|--|-----------|--------------------------------------|-------------------------------|--|--|--|
| 14 | Brockwell and Gordon (2001) | Australia | <i>Statistics in Medicine</i> | Maximum likelihood theory | Statistical Methods for Medicine | The fixed effects do not perform well unless there is very little variation between the studies. | Meta-analysis |
| 15 | Higgins (2001) | USA | <i>Statistics in Medicine</i> | Statistical theory | Test in Alzheimer disease | A general framework is developed which encompasses traditional meta-analysis, as well as meta-regression and the inclusion of patient-level covariates for investigation of heterogeneity | Experiments and meta-analysis |
| 16 | Hussey (2001) | UK | <i>Strategic change</i> | Conceptual model | Strategic thinking and strategic success | Interrelationship of analysis and creative thinking, of factors previously identified as critical for strategic success. | Conceptual model |
| 17 | Lipsey and Wilson (2001) | USA | <i>Practical Meta-analysis</i> | | Concepts of Meta-Analysis | This book describes the various types of meta-analysis methods and how meta-analysis helps in analysing the homogeneity and heterogeneity of the variables | Meta-analysis |
| 18 | Aiman-Smith and Green (2002) | USA | <i>Academy of Management Journal</i> | Technology contingency theory | Strategic thinking and TC | This study considered three issues; how characteristics affect the individual implementation outcomes; the effects that technology Characteristics have on learning activities; and how learning activities affect outcomes. | Correlation analysis |
| 19 | Graetz (2002) | Australia | <i>Management Decision</i> | | Communication Industries | Describes the five major attributes of strategic thinking using the case studies | Case study |
| 20 | Julian and Thompson (2002) | USA | <i>Statistics in Medicine</i> | Statistical theory | Clinical tests | Levels of heterogeneity and its calculations | Experiments a meta-analysis (continued) |

Table All

| Sl. No. | Author/year | Country | Journal | Theory | Context | Characteristics /findings | Methodology |
|---------|-----------------------------|---------|--|---|--|---|-------------------|
| 21 | Camerer (2003) | USA | <i>Trends in Cognitive Science</i> | Behavioral Game Theory & Game theory Models | Impact of game theory in psychology | Paper extends the cognitive plausibility and empirical accuracy of the game theory, expressing ideas in mathematical models that permit rapid progress. | Conceptual |
| 22 | Leavy (2004) | UK | <i>Strategy & Leadership</i> | Business strategy model | Outsourcing strategies | This study explains how strategic thinking helps in outsourcing strategies and their effectiveness | Conceptual |
| 23 | Bonn (2005) | | <i>Leadership & Organization Development Journal</i> | Managerial and Organisational Cognition | Development of strategic thinking at a multilevel approach | Strategic thinking at the individual levels is discussed in terms of diversity in representational systems. Strategic thinking at the group level looks at heterogeneity and conflict. Strategic thinking within the organisational context examines middle management involvement, the role of OS, and reward and compensation systems | Conceptual model |
| 24 | Drejer (2005) | Denmark | <i>International Journal of Learning</i> | Organisational theory | Strategic scanning in hyper-competitive markets | The volatile environment of many organisations challenges strategic management systems (and top managers) to improve their surveillance and learning about changes in the environment. | Literature review |
| 25 | Larson and Hansen (2005) | USA | <i>Human Development</i> | Action theory | Strategic thinking and social change | This article explores the development of strategic thinking in a youth activism program in which young people worked for social change. | Conceptual |
| 26 | Reston and Shuhaiber (2005) | USA | <i>European Journal of Cardio-thoracic Surgery</i> | | Literature review of Medical examinations | This study explains the literature evaluating maze clinical outcomes suffers from several shortcomings, particularly small sample sizes and selection bias | Meta-analysis |
| 27 | Rice and Harris (2005) | Canada | <i>Law and Human Behavior</i> | Statistical theory | Concepts of Meta-Analysis | This study facilitates comparisons across follow-up studies that have used different measures of effect size | Meta-analysis |

(continued)

Table All

| Sl. No. | Author/year | Country | Journal | Theory | Context | Characteristics /findings | Methodology |
|---------|-------------------------|--------------|---|--------------------------------|---|---|---------------------------------------|
| 28 | Yarger (2006) | USA | Book on Big Strategy | Business strategy model | Concepts of strategic management | This book gives an essence of the different strategies that can be used in the development of business in the twenty-first century. | Conceptual |
| 29 | Alimi (2007) | India | Journal of Indonesian Economy and Business | Systems thinking | Strategic thinking, planning and decision making | The role of managers in the process of strategic planning and decision making depends on how they are thinking | Fuzzy analytical hierarchy process |
| 30 | Alsaaty (2007) | | Journal of Business Research and Economics | Systems thinking | The strategic thinking of individuals in an organisation | A perspective that links venture creation to the strategic thinking skills of profit-seeking individuals, who act to exploit market opportunities made possible largely by external forces | Conceptual |
| 31 | Huang and Keskar (2007) | USA | International Journal of Production Economics | Multi-attribute utility theory | Suppliers in original equipment manufacturer (OEM) industries | Integration mechanism in terms of a set of comprehensive and configurable metrics arranged hierarchically that takes into account product type, supplier type, and OEM/supplier integration level | Analytical hierarchy process |
| 32 | Laméris (2008) | | European Radiology | Statistical theory | Meta-analysis in clinical experiments | The study investigates the diagnostic accuracy of graded compression ultrasonography (US) and computed tomography (CT) in diagnosing acute colonic diverticulitis (ACD) in suspected patients | Experiments & meta-analysis |
| 33 | Pagani (2009) | USA & Europe | Technology Forecast and Social Change | Business strategy model | Telecom Industry in the USA and Europe | This study speaks about identifying basic trends and uncertainties useful to develop corporate or business strategies in the telecom industry. | Porters value chain & scenario method |

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Table A11

| Sl. No. | Author/year | Country | Journal | Theory | Context | Characteristics /findings | Methodology |
|---------|-----------------------------|-------------|--|----------------------------|---|---|-------------------------------|
| 34 | Mark <i>et al.</i> (2008) | Netherlands | <i>Clinical Psychology Review</i> | Behavioural couple therapy | Literature Review | This study explains the narrative reviews conclude that behavioural couples therapy (BCT) produces better outcomes than individual-based treatment for alcoholism and drug abuse problems | Meta-regression analysis |
| 35 | French (2009) | Australia | <i>Journal of Management Development</i> | Critical theory | Business strategy and strategic thinking | This study examines critically the theory of business strategy and reframes strategic thinking in order to develop and test a viable small business strategic process. | Action research |
| 36 | Reus and Rottig (2009) | China | <i>Management International Review</i> | Agency theory | International Joint Ventures in China | This paper revealed the moderating impact of methodological and contextual artefacts, such as different types of construct operationalisation, and the distinct character of IJVs in China | Meta-analysis |
| 37 | Casey and Goldman (2010) | USA | <i>Managerial Learning</i> | Adult learning theory | Model of learning to think strategically | The model depicts a dynamic, interactive, and iterative experiential learning process. It identifies individual factors, work experiences and organisational factors that contribute knowledge and act together to develop the ability to think strategically | Conceptual |
| 38 | Moon (2010) | Korea | <i>Journal of Business Research</i> | Systems thinking | The strategic thinking of top-level managers in the Korean firm | This study provides a hypothetical model that links the firm's internal and external variables regarding strategic thinking at the organisational level, which in turn links to marketing performance | Structural equation modelling |
| 39 | Shirvani and Shojaie (2011) | Iran | <i>Social and Behavioural Sciences</i> | Systems thinking | Strategic thinking ability of leaders | The study has described and discussed strategic thinking as an individual leadership ability required at multiple organizational levels. | Conceptual |

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Table AII

| Sl. No. | Author/year | Country | Journal | Theory | Context | Characteristics /findings | Methodology |
|---------|--|-----------|---|------------------------------|---|---|----------------------|
| 40 | Steptoe-Warren et al. (2011) | UK | <i>Journal of Strategy and Management</i> | Psychological theory | Strategic thinking and decision making | This study examines both management and psychological literature on strategic decision making. The literature review reveals that managerial cognition, as well as individual and corporate values, can have an impact on strategic decision making | Literature review |
| 41 | Cooper (2012) | Canada | <i>Journal of Enterprising Communities: people and places in global economies</i> | Risk management theory | Strategic frisk in Canadian communities | This paper examines the management of strategic public sector risks in communities and municipalities. Financial, environmental, social and other strategic risks were found to be important by communities but not necessarily managed as part of the strategic planning process | Content analysis |
| 42 | Goldman (2012) | USA | <i>Journal of Strategy and Management</i> | Organisational theory | Strategic thinking in US healthcare | Specific ways in which OC may impact strategic thinking in others | Tool development |
| 43 | Shaheen et al. (2012) | Pakistan | <i>Arabian Journal of Business and Management Review</i> | Systems thinking | Strategic Thinking types | This paper explores the nature of thinking which leads strategists to success and make them comfortable in meeting the challenges of the twenty-first century business world. | Conceptual |
| 44 | Taluqder (2012) | Australia | <i>Social and Behavioural Sciences</i> | Technology innovation model | Technology innovation in Australia | This paper investigates the determinants of the adoption of technological innovation by individual employees within an organizational context in Australia | Basic statistics |
| 45 | Coeurderoy et al. (2014) | Belgium | <i>Management Decision</i> | Unified Theory of Acceptance | European Telecommunications Company | The purpose of this paper is to explore how drivers differentially speed up the change process adoption in the perspective of a TC | Correlation analysis |

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Table All

| Sl. No. | Author/year | Country | Journal | Theory | Context | Characteristics /findings | Methodology |
|---------|-----------------------------|---------|--|-----------------------|-------------------------------------|--|-------------------------------|
| 46 | Kiptoo and Mwirigi (2014) | Kenya | <i>Journal of Business and Management</i> | Psychological theory | Leadership and organisation culture | This paper specifically analyses the factors that influence strategic planning and recommendations that can be employed in order to have a successful implementation of strategic planning in the organizations. | Literature review |
| 47 | Weaver (2014) | USA | <i>Academy of Education Leadership Journal</i> | Decision model | Course delivery in business schools | This paper explains how the course delivery in business schools helps in the improvement of decision-making skills using a cause and effect analysis | Cause and effect analysis |
| 48 | Calandro (2015) | | <i>Strategy and Leadership</i> | Risk management model | Strategic Risk Management | The problem for corporate leaders is that enterprise risk managers do reasonably well identifying, modelling and mitigating more knowable risks such as some potential natural catastrophes, but they face a bigger challenge identifying, quantifying and mitigating more ambiguous threats that initially only generate weak signals, such as financial crises | Conceptual |
| 49 | Kazmi and Naaranoja, (2015) | Turkey | <i>Social and Behavioural Sciences</i> | Systems thinking | Strategic thinking models | Leaders, considered as the builders and reformers of the organization's internal environment, possess the ability to enhance and establish a stronger connection between organizational processes and the team workers' ability to learn to think strategically | Descriptive statistics |
| 50 | Hamed et al. (2015) | Iran | SAUSSUREA | Organisational theory | Tose'e Taavon Bank in Iran | This study concludes that the market turbulence and TCs, which the organization needs to learn necessary steps to manage them, prepare the groundwork to develop and strengthen strategic thinking | Structural equation modelling |

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Table All

| Sl. No. | Author/year | Country | Journal | Theory | Context | Characteristics /findings | Methodology |
|---------|---|-------------|---|-----------------------|--|--|-------------------------------|
| 51 | Haans et al. (2016) | Netherlands | <i>Strategic Management Journal</i> | U-shaped relationship | Theorising and testing | How relationships can be better theorized and tested based on a review of articles exploring U-shaped relationships | Regression models |
| 52 | Ibrahim Olaniyi and Elumah Lucas (2016) | Nigeria | <i>Journal of Business Administration Research</i> | Systems thinking | Strategic thinking in Nigerian Firms | Nigerian business environment has its own unique quality which differs from what is obtained from other parts of the world and as such there is a need for managers of firms in Nigeria to think strategically in order to have a large market share | Correlation analysis |
| 53 | Kaazmi et al. (2016) | Turkey | <i>Social and Behavioural Sciences Mediterranean Journal of Social Sciences</i> | Systems thinking | New product development and strategic thinking | The proposed theoretical linking between strategic thinking and product innovation supports industrial work teams' effectiveness. | Scale development |
| 54 | Shahbazzadeh et al. (2016) | Iran | <i>Journal of Social Sciences</i> | Systems thinking | Knowledge management and organizational innovation at the National Oil Products Distribution Company in Miandoab region. | This study states that there is a relationship between strategic thinking and the establishment of knowledge management and organizational innovation at the National Oil Products Distribution Company in Miandoab region | Confirmatory factor analysis |
| 55 | Ameyaw and Alfen (2017) | Ghana | <i>Journal of Facilities Management</i> | Risk management model | Risk in industries of Ghana | The paper identified 30 risk factors associated with four major private sector PG projects in Ghana. The allocation and mitigation strategies of these risks are also reported. | Case study |
| 56 | Arayesh et al. (2017) | Iran | <i>International Journal of Organizational Leadership</i> | Organisational theory | The OC of Ilam Gas Refinery | investigate the effect of organizational culture on the development of strategic thinking at the organizational level of Ilam Gas Refinery | Structural equation modelling |

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Table All

| Sl. No. | Author/year | Country | Journal | Theory | Context | Characteristics /findings | Methodology |
|---------|-------------------------------|-------------|--|---------------------|--|---|--------------------------------------|
| 57 | Salavati <i>et al.</i> (2017) | Iran | <i>Electronic Physician</i> | Statistical methods | Medical sciences university in Iran | This paper states that participants have acceptable strategic thinking levels, although there is still room for improvement. Therefore, considering the factors such as the educational development of managers and personnel can be very useful for developing thinking. | ANOVA |
| 58 | Al-Qatamin and Esam (2018) | Jordan | <i>International Journal of Business and Management</i> | Systems thinking | Strategic thinking concepts | Reflecting, Reframing and systems thinking have a significant impact on the strategic thinking which leads to competitive advantage. | Correlation analysis |
| 59 | Moghadam <i>et al.</i> (2018) | Baluchestan | <i>Revista Publicando</i> | | Customs administration of Baluchistan province | This paper explains how strategic thinking effects the innovation performance of the customs administration of a Baluchistan Province | Case study |
| 60 | Samuel <i>et al.</i> (2018) | Kenya | <i>South African Journal of Economic and Management Sciences</i> | Systems thinking | Indigenous Banks in Kenya | This research has established that strategic thinking is an important determinant of leadership effectiveness for indigenous banks in Kenya and therefore supports prevailing literature and theory indicating a positive relationship | Factor analysis and parametric tests |