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Paving the Path toward Strategic Agility:

A Methodological Perspective and an Empirical Investigation

Majid Nejatian[1], Mohammad Hossein Zarei[*2], Ali Rajabzadeh[1], Adel Azar[1], Ameneh Khadivar[3] &*

1. Faculty of Management and Economics, Tarbiat Modares University, Tehran, Iran.
2. * *corresponding author: mohammadhossein.zarei@polimi.it*
    a) School of Management, Politecnico di Milano, Milan, Italy
    b) Coventry Business School, Coventry University, Coventry, UK.
3. Department of IT management, University of Alzahra, Tehran, Iran.

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Abstract: '

***Purpose*:** For organizations competing in volatile environments, strategic agility is the key for sustaining in the market. It is essential for such organizations to identify the main agility indicators that contribute to their strategic core. The purpose of this paper is to propose and test a systematic methodology that identifies key agility indicators through prioritization and establishing the intra- and inter-relationships among them.

Design/methodology/approach: The methodology consists of four phases. Phase I forms a pool of agility key performance indicators (KPIs). Phase II categorizes and ranks the KPIs based on their importance and the gap that exists between their current and desired level. Using interpretive structural modeling (ISM), phase III establishes the intra-relationships among the KPIs as well as agility attributes, agility enablers, and improvement paths, collectively referred to as agility indicators. Finally, phase IV analyzes the inter-relationships among agility indicators using three consecutive houses of quality (HOQs).

Findings: To demonstrate the capability of the proposed methodology, it was applied to a dairy food company operating in a competitive environment. The application could address the shortcomings of previous agility methodologies and helped the company to assign resources to the right agility indicators with the highest influence on strategic agility.

Research limitations/implications: The methodology was applied to a single organization only. The application does not include long-term post-implementation observations and measurement of strategic agility.

Practical implications: Practitioners can benefit from the methodology to identify the right agility indicators of their organization and assign organizational resources for the improvement of such indicators. The methodology ensures selecting indicators that contribute to organization's strategic agility, although ostensibly seem unrelated.

Originality/value: The paper contributes to the literature of strategic and organizational agility by proposing a systematic methodology that considers both intra- and inter-relationships among agility indicators. The methodology also makes a decent contribution in addressing organizational ambidexterity by analyzing mutually exclusive indicators pertaining to current and future opportunities for the organization.

Keywords: strategic agility; organizational agility; balanced scorecard; interpretive structural modeling; quality function deployment, house of quality, fuzzy logic.

1. Introduction

In recent years, frequent changes in the market and business environment have become bolder than ever. The dominance of internet and related emerging phenomena such as internet of things and industry 4.0, rapid technological advancements, changes in customers' taste, and the internal changes in organizational environment such as increased knowledge transfer rate and complex employee management are some of the drivers that put an evolving pressure on organizations to quickly adapt and respond to the changes in their working environment. The permanence of *change* as an intrinsic element of the 21st century's market submits that organizations have to continuously revisit their strategic decisions. Organizations which are not able to keep the pace with the change are pushed to the margins or eliminated from the market.

Academic literature, in keeping with the business environment, has been contending to investigate the ways that organizations can deal with such *changes* and how they can align their strategies accordingly. Some concepts such as sustainable competitive advantage, resource-based view, and strategic planning have emerged to serve the purpose. These concepts, however, have fallen short of clarity and utility for managers (Weber and Tarba, 2014, Ivory and Brooks, 2018). Strategic agility has been gaining momentum in response to the criticisms raised to the earlier concepts. It can be defined as the competitive capabilities that enable organizations to cope with changing environments by constantly and rapidly spotting, sensing, and seizing through intentional strategic moves and changing organizational configuration (Sull, 2009, Weber and Tarba, 2014).

Strategic agility involves a set of actions taken by an organization which operates in a volatile environment. The actions and their consecutive organizational changes are distinct from routine changes in that they pertain to the strategic core of the organization and entail systematic and continuous changes (Weber and Tarba, 2014). Scholars have defined three main organizational meta-capabilities that are essential to an agile organization: strategic sensitivity, collective commitment, and resource fluidity (Doz and Kosonen, 2010). Strategic sensitivity is the intensity of perception and attention to strategic development. Collective commitment is the common interest, empathy, and trust to increase the engagement of organizational members. Finally, resource fluidity is the ability to reconfigure capabilities and redeploy resources rapidly.

The literature of strategic agility entails significant research on i) developing and applying the meta-capabilities and their underlying characteristics and ii) investigating the issues of organizational business model and leadership and their interaction with strategic agility (Fourné et al., 2014, Doz and Kosonen, 2010, Anna et al., 2017). Other topics covered in the literature involve deploying information technology (IT) for strategic agility (Weill et al., 2002, Sambamurthy et al., 2003), the interaction of human resource function with corporate strategic agility (Sambamurthy et al., 2003), corporate language in strategic agility (Brannen and Doz, 2012), and paradoxical corporate issues and strategic agility (Lewis et al., 2014, Ivory and Brooks, 2018). Little could be found in the extant literature about the methodologies to attain and improve strategic agilities.

From practical point of view, as organizations gain some success through setting their strategies in line with their vision and mission statements, they tend to keep the same strategic plans and eventually become the victim of their own success due to diminished creativity and ability to adapt to changes (Doz et al., 2008, Doz and Kosonen, 2010). As such, organizations focus on the main sources of growth and performance over time while neglecting that they simultaneously become more rigid to change in their strategic model. This rather slow and often unnoticeable process, referred to as *curse of success* (Doz et al., 2008) highlights the need to methodologies that continuously evaluate corporate strategic bases and guide managers to shift organizational attention towards the most relevant areas.

Therefore, methodological approaches to maintain strategic agility are needed both from academic and practical points of view. Yet, the literature scants approaches that identify the organizational areas for change and delineate how to improve those areas to make the organization more agile. This means that we *know* what the essential strategic agility capabilities are, but we know little about *how* to achieve them and put them into practice (Morton et al., 2018). Without systematic approaches, strategic agility might fall in the same pitfalls of its predecessor concepts such as sustainable competitive advantage and strategic planning; de facto relatively little has been done to specify and operationalize strategic agility measures and the concept has remained elusive (Weber and Tarba, 2014). The structured literature review of Fayezi et al. (2017) on organizational and supply chain agility revealed that the majority of research are based on surveys or case studies and there is paucity of research on agility methodology designs. Furthermore, they asserted that relationship dynamics, i.e. intra- and inter-relationships among agility indicators related to the internal and external organizational environment, are overlooked.

Another gap in the literature of strategic agility pertains to organizational ambidexterity; i.e. how leaders can address incompatible or mutually exclusive aims with limited resources. Organizational ambidexterity is about exploiting existing competencies while simultaneously exploring new opportunities. While limited research (Rialti et al., 2018) has shown that capabilities such as information technologies and big data analytics contribute to organizational ambidexterity, and ultimately to strategic agility, the concept and approaches to achieve it have seldom been addressed and remains a core leadership challenge (Charles A. O'Reilly and Tushman, 2013, Birkinshaw and Gupta, 2013). This paper contends to bridge these gaps in research and practice by attending to the following threefold research question:

What is the appropriate strategic agility approach that:

- *facilitates selection of the right agility indicators (i.e. KPIs, agility attributes, and agility enablers)?*
- *establishes the intra- and inter-relationships among the agility indicators?*
- *and eventually enables organizations to achieve or improve their strategic agility?*

The study responds to the calls for more methodological perspectives about the strategic agility. The proposed methodology addresses the gap about establishing the intra-

relationships among agility indicators through implementation of interpretive structural modeling (ISM) and the inter-relationships through quality function deployment (QFD). Moreover, it attends to the issue of organizational ambidexterity first by categorizing incompatible or mutually exclusive agility indicators under different balanced scorecard (BSC) perspectives. Second, the agility indicators are prioritized based on not only their current *importance* but also their future *necessity* in achieving strategic agility goals. It enables organizations to exploit existing competencies while exploring emerging opportunities at the same time and contributes to their ambidexterity.

The rest of the paper is as follows. Section 2 reviews the evolvement of agility and strategic agility methodologies. Section 3 proposes a methodology to improve strategic agility. Section 4 applies the methodology to the case of an international food company. Section 5 discusses the findings of application. Finally, section 6 concludes the paper and states the limitations of the study and future research directions.

2. Survey of Literature

2.1. From Manufacturing Agility to Strategic Agility

By increasing complexity, competition, and rapid changes in the market, manufacturing industries realized that they require new capabilities to adapt their manufacturing processes with the market needs. In 1960s, the research community focused on the concept of *adaptability* to address the issue (Burns and Stalker, 1961). Later, in 1980s, *flexibility* as a concept that enabled organizations to adjust their internal structure with external changes became prominent. It was only in the beginning of 1990s that agility appeared as an overarching concept by researchers of Iacocca Institute of Lehigh University (Sherehiy et al., 2007). They defined it as "*a manufacturing system with capabilities (hard and soft technologies, human resources, educated management, information) to meet the rapidly changing needs of the marketplace (speed, flexibility, customers, competitors, suppliers, infrastructure, responsiveness)*" (Yusuf et al., 1999, p. 36). The concept of agile manufacturing has since then gained increasing attention from scholars and contributed to other manufacturing concepts such as just-in-time, lean, and flexible manufacturing (Sanchez and Nagi, 2001).

The transition towards service-product systems and internet-dominant businesses in the beginning of 21st century propelled non-manufacturing organizations to adopt the concept of agile manufacturing; leading to the inception of enterprise and organizational agility as a new stream of literature (Shin et al., 2015). Whether it is strategic agility at healthcare services (Mandal, 2018) or in the shipping industry (Pantouvakis and Karakasnaki, 2018), corporates have realized that that to retain their competitive market advantage agility needs to become an integral part of the strategic planning at organizational and inter-organizational level. With the growing applications of information communication technologies and new emerging concepts such as industry 4.0 and internet of things, it is no surprise that information technologies and big data capabilities have been identified by most studies as the main facilitator in achieving strategic agility (Tan et al., 2017, Queiroz et al., 2018, Hazen et al., 2017, Ghasemaghaei et al., 2017).

At inter-organizational level, the research on supply chain agility transcends the importance of agility beyond single-firm boundaries. Recent studies of Abdoli Bidhandi and Valmohammadi (2017) and Sahay et al. (2017), inter alia, have confirmed the positive impact of strategic agility on supply chain performance. Lim et al. (2017) expressed that agility has to be considered in the early supply chain planning levels, i.e. supply chain design. Congruently, the multiple case study of Battistella et al. (2017) showed that agility should be institutionalized in early stages of developing organizational business model. Recent literature reviews of Fayezi et al. (2017) and Abdelilah et al. (2018) synthesizes the evolvement of agility literature at enterprise and supply chain levels. Readers are directed to those reviews for an elaborated reading. Congruent with the literature (e.g. Vázquez-Bustelo et al. (2007) and Yang and Liu (2012)), the reviews reveal that increased agility offers competitive advantage to organizations by improving their performance and their ability to respond quickly to environmental changes.

Despite significant progress on the topic hitherto, a persisting challenge of enterprise agility lies in developing agility indicators that are embedded in strategic core (Bessant et al., 2002, Appelbaum et al., 2017a, Appelbaum et al., 2017b). Organizations might be able to temporarily become agile through benchmarking, intermittent R&D improvements or technology transfer. Yet, only by deep and continuous embeddedness of agility in the strategic core they can achieve competitive advantages and market sustainability (Ivanov, 2010, Shin et al., 2015).

2.2. Agility Methodologies

Although agility presents a mature body of literature, methodologies to achieve agility are scant. More importantly, most of the proposed methodologies remain at conceptual level and empirical testing and application is missing (Bottani, 2009). This sub-section reviews the extant literature to unearth agility methodologies and their applications.

A set of agility indicators have been consistently used in agility methodologies, namely agility drivers, agility attributes, and agility enablers. Agility drivers are external pressures in the working environment that necessitate firms to search for new ways of running business to maintain their competitive advantage (Sharifi and Zhang, 2001). Agility attributes, also referred to as agility capabilities, are essential capabilities a firm has to develop to effectively and positively cope with the agility drivers (Sharifi and Zhang, 2001, Bottani, 2009). Finally, agility enablers are leverages used by firms to best achieve agile attributes (Bottani, 2009, Bottani, 2010, Lin et al., 2006). Several studies unearthed and classified different agility indicators. The change is unanimously identified as the main agility driver originating from market, customers, technology, and social factors, inter alia (Vázquez-Bustelo et al., 2007, Tseng and Lin, 2011). Coming to agility attributes, the recent literature review of Abdelilah et al. (2018) synthesizes seven attributes viz. flexibility, speed, responsiveness, quality, dependability, cost, and competency. The main agility enablers pertain to technologies such as enterprise resource planning (ERP), flexible manufacturing systems (FMS), and IT, as well as organizational practices such as concurrent engineering, knowledge management, and team building (Bottani, 2010, Vázquez-Bustelo et al., 2007, Abdelilah et al., 2018).

Methodological agility studies evolved from agile manufacturing context in keeping with the evolution of the agility concept. Seminal studies of Gunasekaran (1998), Zhang and Sharifi (2000), and Jackson and Johansson (2003) proposed methodologies for agile manufacturing by interrelating agility drivers, attributes, and enablers. The methodology of Gunasekaran (1998) linked four agility attributes viz. i) co-operation, ii) value-based pricing strategies, iii) investments in people and information, and iv) organizational changes to agility enablers to achieve higher agility in manufacturing. Similarly, the methodology of Zhang and Sharifi (2000) and its subsequent development and application in Sharifi and Zhang (2001) connected agility drivers to four agility attributes. In doing so, they proposed a set of *agile providers* to ensure achieving agility attributes. Jackson and Johansson (2003) suggested four dimensions for agility attributes viz. i) product related change capabilities, ii) change competency, iii) co-operation internally and externally, and iv) people, knowledge, and creativity, followed by testing the methodology in a manufacturing firm.

Few studies could be found in the literature of agility that build upon the agility indicators to propose methodologies that help organizations, irrespective of industry, to become strategically agile. The study of Bottani (2009) and its development in Nejatian and Zarei (2013) propose an integrated methodology to consecutively identify agility attributes that correspond to competitive bases and the agility enablers that satisfy the identified agility attributes. Both studies, however, leave empirical application of the proposed methodologies to future research. Recent work of Nejatian et al. (2018) develops the methodology of Bottani (2009) and applies it to the case of a food company. Both of those studies proposed house of quality (HOQ), a component of QFD, as a viable tool to understand and evaluate the interrelation between agility indicators. However, the methodology proposed by both studies loses its utility when the number of inputs to HOQs increases significantly. Nejatian et al. (2018) associated the issue to the increased amounts of calculation within HOQs leading to unusually large HOQs which are difficult to visualize and interpret. Practically, large firms often deal with high numbers of agility indicators, all of which need to be considered to ensure a comprehensive strategic agility planning and organizational ambidexterity. Moreover, the proposed methodologies by Bottani (2009) and Nejatian et al. (2018) do not consider the intra-relationships among agility indicators. The proposed methodology of this paper addresses these shortcomings by first providing a comprehensive empirical investigation and second evaluating the intra-connection among agility indicators and select the ones with high driving power on firm's strategic agility and low dependence on other indicators. This evaluation, in turn, decreases the inputs to the HOQs and avoids computational and visualization complications. While high citations to the other methodologies by research community endorse their utility and relevance, this study contributes to strategic and enterprise agility literature by developing and advancing the previous methodologies and demonstrating a comprehensive empirical analysis.

3. The Proposed Methodology

The proposed methodology consists of four main phases viz. i) synthesis of KPIs, ii) prioritizing KPIs, iii) evaluating the intra-relationships among agility indicators, followed by iv) evaluating inter-connection among them and selecting the best improvement paths for strategic agility. The proposed methodology is illustrated in Figure 1. Throughout the methodology, fuzzy logic is extensively deployed in combination with other techniques, viz. fuzzy Likert scale, fuzzy technique for order of preference by similarity to ideal solution (TOPSIS), fuzzy screening, and fuzzy QFD, to address the ambiguity and uncertainty inherent in the competitive and volatile working environments where strategic agility is needed the most. In the following, the phases within the methodology are described.

The methodology starts with identifying the main KPIs. At this phase, based on the analysis of the pertinent literature and organizational data, a pool of KPIs is formed. Oftentimes, it is necessary that the literature analysis focuses on finding industry-specific KPIs. The sources of organizational data include organization's mission, vision, values, strategic plans, objectives as well as organizational managers' ideas. Next, using BSC, the pool of KPIs is categorized under four perspectives: financial, customer, internal processes, and learning and growth.

The objective of phase II is ranking the categorized KPIs not only based on their *importance* but also according to the organizational *need* to KPIs with respect to strategic agility. The seminal study of Zhang and Sharifi (2000) expresses that agility methodologies should consider the *gap analysis* to delineate organization's standing on the spectrum of *no need*- to *high need to agility*. It also contributes to the organizational ambidexterity by prioritizing the KPIs which are *needed* more for the exploitation of future opportunities to make the organization more agile. Hence, in our proposed methodology, after investigating the importance of KPIs through a fuzzy-Likert scaled questionnaire, organizational experts are asked to provide their opinions in a second questionnaire, again with fuzzy-Likert scale, to measure the gap between the current level and the desired level of strategic agility with respect to each KPI. Finally, a fuzzy TOPSIS is used to rank the KPIs, taking into account the importance of KPIs and their gap.

Phase III uses ISM to identify and visualize the intra-relationships among the ranked KPIs, agility attributes, enablers, and improvement paths. The analysis of intra-relationships delineates the indicators' driving power and dependence with respect to the strategic agility and therefore, helps to focus on the indicators with high driving power and low dependence on other indicators. To this end, first, a structural self-interaction matrix (SSIM) establishes pairwise comparisons between KPIs through a *lead to* contextual relationship. Then, a reachability matrix is developed from the SSIM and transitivity, as a basic assumption of ISM, is checked. The reachability matrix is then partitioned into different level. A MICMAC analysis delineates the indicators with high driving power and low dependence on other indicators to be used as the input for the first HOQ in the next phase.

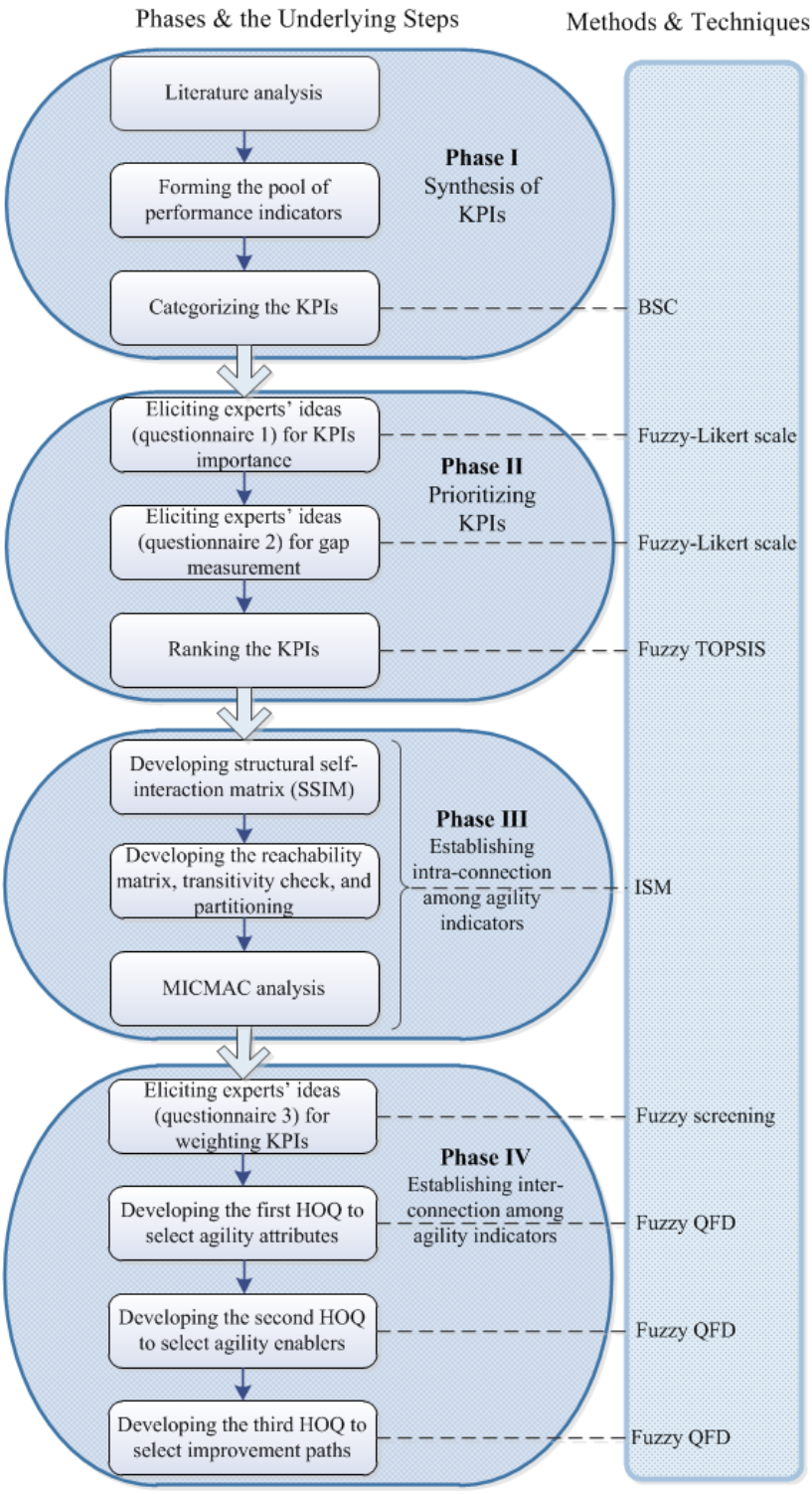


Figure 1: The Proposed Methodology

Finally, the phase IV is aimed at identifying the inter-relationships among indicators and selecting the most suitable improvement paths for strategic agility. To this end, a sequence of three interrelated HOQs are deployed. Each HOQ transforms a set of input *Whats* into a set of output *Hows* that satisfy the inputs. In our proposed methodology, the *Hows* from one HOQ are used as the *Whats* in the subsequent HOQ. Advocated by Hauser

and Clausing (1988), linking HOQs successively in this way ensures interfunctionality of organizations. The sequence of HOQs starts from explicitly important agility indicators and ends in pivotal improvement paths that eventually lead to a more strategically agile organization, even though their contribution to strategic agility might not be visible to the naked eye from the outset.

For each HOQ, it is necessary to assign weights to the inputs. For the first HOQ, the ideas of organizational experts are gathered and analyzed using fuzzy screening technique to determine the weights of KPIs. The second and third HOQ use the fuzzy values from their preceding HOQ as weights. The identified KPIs from phase III are inserted into the first HOQ as *Whats* to arrive into a set of agility attributes. These agility attributes are then used as the input of the second HOQ to identify relevant agility enablers. Finally, the agility enablers are inserted into the third HOQ to find the improvement paths of strategic agility. For an elaborated reading on the details of HOQ development, readers are directed to Bottani (2009) and Nejatian et al. (2018). The methodology ends with the identification of the most critical improvement paths, categorized under BSC perspectives and ranked based on their priority in achieving strategic agility of the organization. Embarking on the identified improvement paths enables the organization to swiftly identify, predict, and adapt with the changes in their business environment and maintain their competitive advantage in future.

4. Empirical Investigation

4.1. Introduction of the Case and the Context

The empirical study was conducted during 2016-2017 in Bel-Rouzaneh Company, an affiliation of La Groupe Bel in Iran. The company is specialized in dairy products such as fresh milk, flavored milk, feta cheese, and processed cheese. With over 80 million population and $440 billion GDP in 2017, Iran is one of the most rapidly-growing economies in the middle east (The World Bank, 2017). While the economy is growing at a 12.5% rate, non-oil industry is turning into the main growth contributor in recent years (The World Bank, 2017). Within non-oil sector, food industry and dairy products are amongst the most competitive industries with many domestic and foreign players present in the market. Hence, the business environment epitomizes a context in which strategic agility is a core sustainability requirement. The respondents of questionnaires for this empirical study were a group of seven organizational experts. Table 1 shows the demographics of the respondents. Zone vice-president (VP) assigned weights to respondents' ideas and supervised the implementation process.

4.2. Phase I: Identifying the Main KPIs

First, a literature survey with a special focus on food industry was conducted to unearth the KPIs impacting on strategic agility. The identified KPIs were sent to a group of experts both from food industry and academia for validation. After validation, the approved KPIs were categorized under four BSC perspective. The KPIs and categorization are depicted in Figure 2. They were used in questionnaire 1 which aimed at identifying the most important KPIs in the company under scrutiny. After prioritization, the categorization will facilitate further investigation of important KPIs by delineating to which BSC perspective each prioritized KPI belongs.

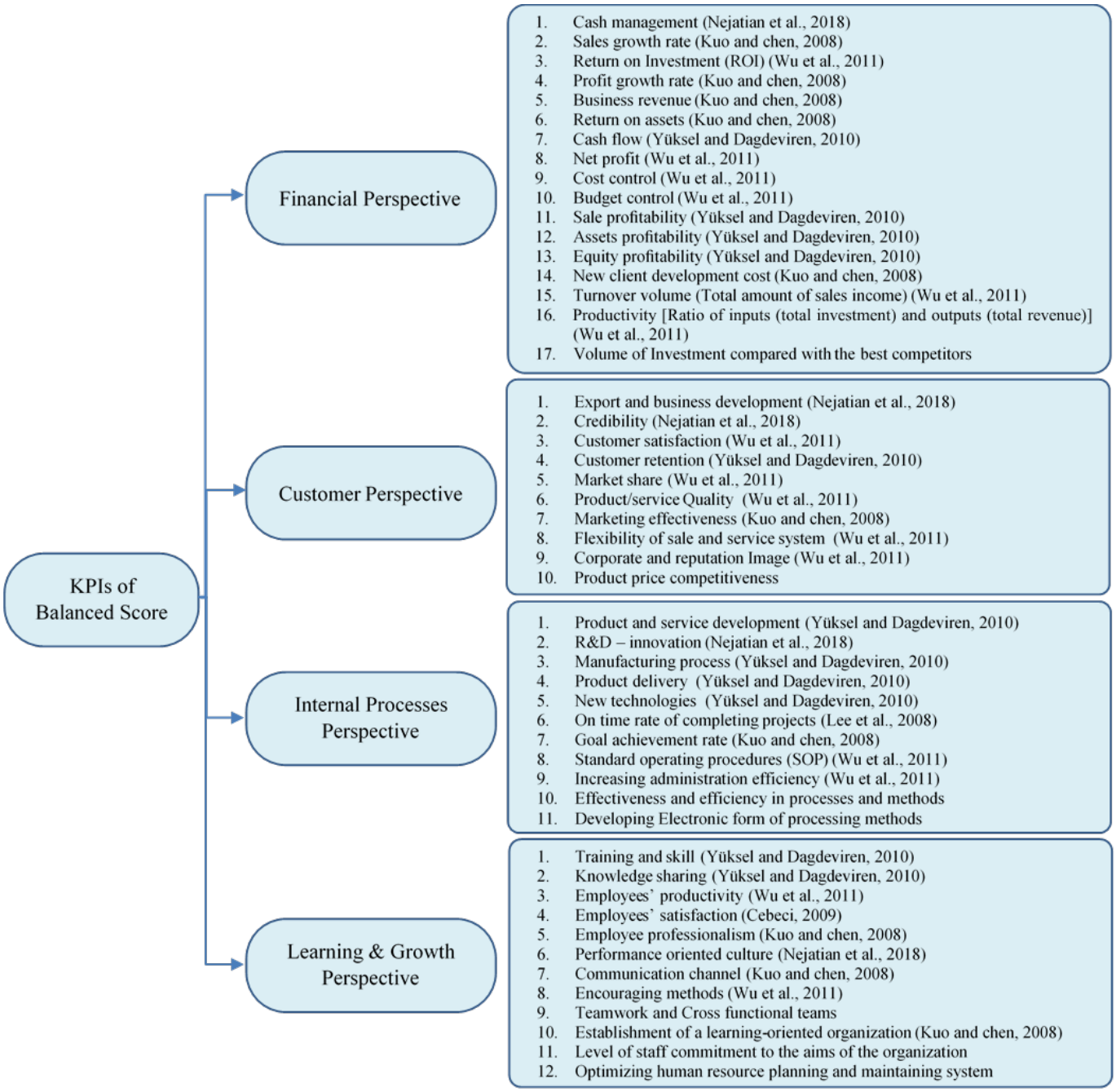


Figure 2: The Identified KPIs used in Questionnaire 1 &

Table 1: The Demographics of Respondents &

Position of the respondent	Experience (years)	Education	Age	Gender
Managing director (MD)	15	MBA (commercial)	45	Male
Chief operational officer (COO)	18	MSc in project management	43	Male
Supply chain director (SCD)	14	MSc in industrial management	42	Male
Commercial director (CD)	13	MBA (commercial)	42	Male
Human resource director (HRD)	17	MBA (human resources)	57	Female
Marketing director (MAD)	16	MBA (marketing)	41	Female
Chief financial officer (CFO)	11	MBA (finance)	41	Male
Zone vice-president (VP)	17	MBA (finance)	46	Male

Notes: MBA, Master of Business Administration; MSc, Master of Science

4.3. Phase II: Prioritizing KPIs

The first questionnaire inquired about the importance of KPIs in the company. For example, the question "*To what extent does the organization provide training to the employees specialized and customized according to their jobs?*" pertains to the KPI *employee professionalism* (Kuo and Chen, 2008). A five-point Likert scale was used for the responses ranging from *the least important* to *very important* which were later translated into fuzzy numbers using the values proposed by Cheng et al. (1999). The respondents could add extra KPIs that were missing in the questionnaire. After collecting the questionnaires, they were sent to the zone-VP for evaluation. He assigned a score to each questionnaire based his managerial insight and the importance of respondents' positions.

Based on the data collected from the questionnaire 1, questionnaire 2 was developed to measure the gap between current and desired level of strategic agility with respect to the identified KPIs. For example, for the aforementioned question regarding *specialized and customized training*, the respondents provided their preferences for the current level of training in the organization and the required level of such training through a five-point Likert scale. Before distribution of questionnaire 2, similar to questionnaire 1, it was also sent to experts for validation. After collecting the responses, the reliability of both questionnaires was assessed based on Cronbach's α. *SPSS* computer software was used to calculate Cronbach's α for each perspective separately. All the values were in the range 0.9 ($\mp$0.4) which was considerably higher than the acceptance threshold of 0.7, confirming the reliability of questionnaires.

Finally, based on the importance of KPIs obtained from questionnaire 1 and the gap analysis obtained from questionnaire 2, the KPIs were prioritized using fuzzy TOPSIS. Table 2 shows the final ranking of KPIs and the pertaining BSC perspectives.

Table 2: Final Ranking of KPIs &

Rank	KPI	CC_i	Perspective	Rank	KPI	CC_i	Perspective
1	Net profit	0.715	Financial	26	Product/service quality	0.578	Customer
2	Cash flow	0.708	Financial	27	Product delivery	0.575	Internal process
3	Market share	0.701	Customer	28	Turnover volume	0.573	Financial
4	Profit growth rate	0.689	Financial	29	Customer retention	0.570	Customer
5	Employee productivity	0.668	Learning & growth	30	Product price competitiveness	0.567	Customer
6	Communication channel	0.657	Learning & growth	31	Effectiveness and efficiency in processes and methods	0.564	Internal process
7	Level of staff commitment to the aims of the organization	0.643	Learning & growth	32	Flexibility of sale and service system	0.562	Customer
8	Knowledge sharing	0.636	Learning & growth	33	Marketing effectiveness	0.559	Customer
9	Training and skill	0.631	Learning & growth	34	Optimizing human resource planning and maintaining system	0.556	Learning & growth
10	Cash management	0.628	Financial	35	Sales growth rate	0.551	Financial
11	Teamwork and Cross functional teams	0.623	Learning & growth	36	Equity profitability	0.548	Financial
12	Customer satisfaction	0.617	Customer	37	Budget control	0.544	Financial
13	Business revenue	0.602	Financial	38	Volume of investment compared with the best competitors	0.542	Financial
14	Performance oriented culture	0.601	Learning & growth	39	Standard operating procedures (SOP)	0.541	Internal process
15	Cost control	0.600	Financial	40	Return on investment (ROI)	0.537	Financial
16	Employee satisfaction	0.597	Learning & growth	41	Goal achievement rate	0.536	Internal process
17	R&D – innovation	0.596	Internal process	42	Product and service development	0.524	Internal process
18	Credibility	0.595	Customer	43	Assets profitability	0.519	Financial
19	Establishment of a learning-oriented organization	0.594	Learning & growth	44	New client development cost	0.513	Financial
20	Export & business development	0.588	Customer	45	Developing electronic form of processing methods	0.510	Internal process
21	Corporate and reputation Image	0.587	Customer	46	Return on assets	0.502	Financial
22	Employee professionalism	0.586	Learning & growth	47	Manufacturing process	0.493	Internal process
23	Encouraging methods	0.585	Learning & growth	48	On-time rate of projects completed	0.474	Internal process
24	Sale profitability	0.583	Financial	49	New technologies	0.451	Internal process
25	Productivity	0.580	Financial	50	Increasing administration efficiency	0.440	Internal process

CC_i is the closeness coefficient to the ideal solution

4.4. Phase III: Intra-Connection among Indicators

Oftentimes, researchers and practitioners encounter large number of factors interacting within a complex system under scrutiny. ISM portrays the interacting factors within the system in form of a structured model that includes graphics as well as words. The results show the order and the direction of the complex relationships among factors in a carefully

designed way. ISM has been used in the proposed methodology to i) derive and visualize intra-relationships among agility indicators ii) classify them based on their driving power and dependence and ii) narrowing down to the key indicators with the highest driving power and the least dependence on other indicators.

Table 3: SSIM of the Selected KPIs

No.	KPI	1	2	3	4	5	6	7	8	9	10	11	12	13
1	Net profit	X	O	O	A	A	O	O	O	O	O	O	O	V
2	Cash flow	O	X	O	O	X	O	A	O	O	A	O	O	O
3	Market share	O	O	X	A	A	O	A	O	A	O	A	A	O
4	Profit growth rate	V	O	V	X	A	O	O	O	O	O	O	O	O
5	Employee productivity	V	X	V	V	X	A	A	A	A	X	A	O	O
6	Communication channel	O	O	O	O	V	X	V	V	A	O	A	O	O
7	Level of staff commitment to the aims of the organization	O	V	V	O	V	A	X	X	A	O	X	X	O
8	Knowledge sharing	O	O	O	O	V	A	X	X	A	O	A	O	O
9	Training and skill	O	O	V	O	V	V	V	V	X	O	V	O	O
10	Cash management	O	V	O	O	X	O	O	O	O	X	O	O	O
11	Teamwork and cross functional teams	O	O	V	O	V	V	X	V	A	O	X	O	V
12	Customer satisfaction	O	O	V	O	O	O	X	O	O	O	O	X	O
13	Business revenue	A	O	O	O	O	O	O	O	O	O	A	O	X

V shows factor i will influence on factor j. !
A shows factor j will influence on factor i. !
X shows factors i and j will influence each other. !
O shows factors i and j are unrelated. !

Table 4: Final Reachability Matrix of the Selected KPIs

No.	KPI	1	2	3	4	5	6	7	8	9	10	11	12	13	Power
1	Net profit	1	0	0	0	0	0	0	0	0	0	0	0	1	2
2	Cash flow	0	1	0	0	1	0	0	0	0	0	0	0	0	2
3	Market share	0	0	1	0	0	0	0	0	0	0	0	0	0	1
4	Profit growth rate	1	0	1	1	0	0	0	0	0	0	0	0	0	3
5	Employee productivity	1	1	1	1	1	0	0	0	0	1	0	0	0	6
6	Communication channel	0	0	0	0	1	1	1	1	0	0	0	0	0	4
7	Level of staff commitment to the aims of the organization	0	1	1	0	1	0	1	1	0	0	1	1	0	7
8	Knowledge sharing	0	0	0	0	1	0	1	1	0	0	0	0	0	3
9	Training and skill	0	0	1	0	1	1	1	1	1	0	1	0	0	7
10	Cash management	0	1	0	0	1	0	0	0	0	1	0	0	0	3
11	Teamwork and cross functional teams	0	0	1	0	1	1	1	1	0	0	1	0	1	7
12	Customer satisfaction	0	0	1	0	0	0	1	0	0	0	0	1	0	3
13	Business revenue	1	0	0	0	0	0	0	0	0	0	0	0	1	2
Dependency		4	4	7	2	8	3	6	5	1	2	3	2	3	

If the (i,j) entry in the SSIM is V, the (i,j) entry in the reachability matrix becomes 1 and the (j, i) entry ! becomes 0. !
If the (i,j) entry in the SSIM is A, the (i,j) entry in the reachability matrix becomes 0 and the (j, i) entry ! becomes 1. !
If the (i,j) entry in the SSIM is X, the (i,j) entry in the reachability matrix becomes 1 and the (j, i) entry ! also becomes 1. !
If the (i,j) entry in the SSIM is O, the (i,j) entry in the reachability matrix becomes 0 and the (j, i) entry ! also becomes 0. !

In our empirical investigation, given the organizational resources assigned by the zone-VP to the project, the first quartile of KPIs from the ranked list (phase II) were selected. For the analysis of the selected KPIs, a contextual relationship of *lead to* was used, meaning that one KPI leads to another KPI. The respondents were asked to make pairwise

comparisons between the selected KPIs in the first quartile. The comparisons with the highest prevalence were selected. For inhomogeneous pairwise comparisons, the experts were asked to provide the comparison again after an internal consultation. A SSIM matrix was developed based on the final preferences as presented in Table 3. Next, the SSIM was converted into a reachability matrix and its transitivity was checked. After incorporating transitivity, the final reachability matrix was achieved, as shown in Table 4.

Next, the reachability matrix was partitioned based on the reachability and antecedents set of each KPI. The KPIs with similar reachability and intersection set do not help to achieve any other KPI above their own, occupying the top level of ISM hierarchy. Once separated from the rest of KPIs, the same process is repeated to identify the KPIs in the next level. The process is continued until all KPIs find their levels. Totally, eight iterations were performed to partition the KPIs. The results are visualized in a diagraph presented in Figure 3.

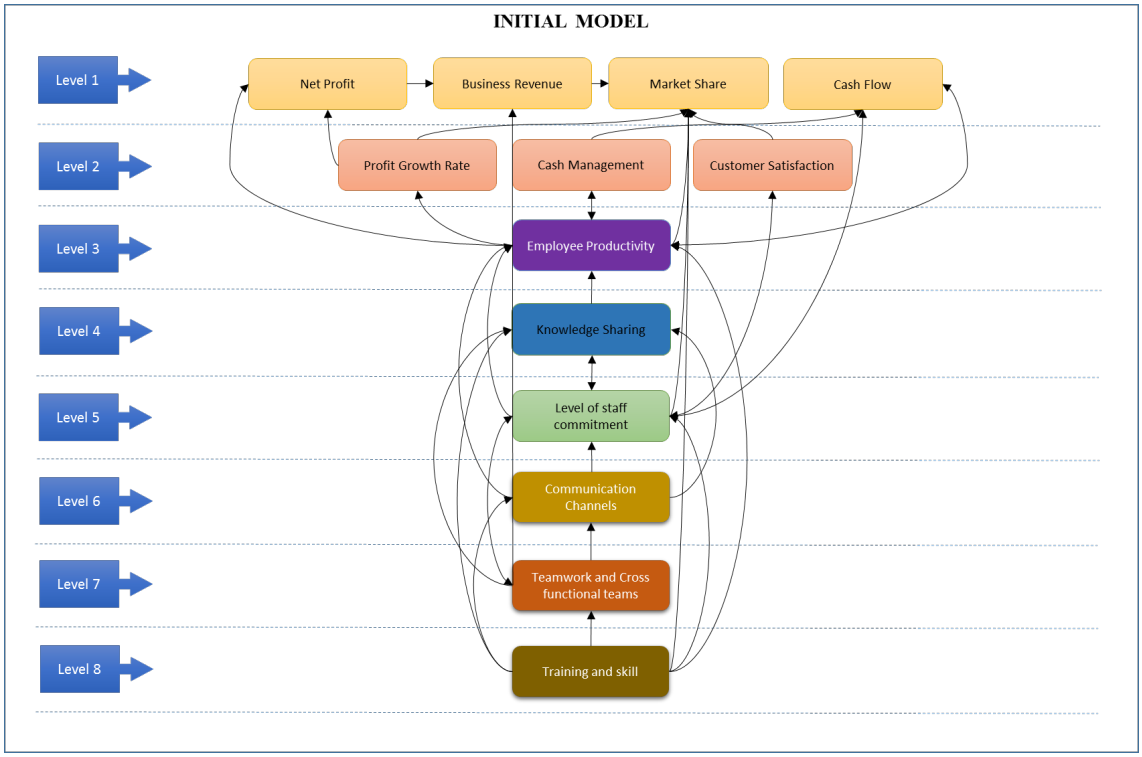


Figure 3: Initial ISM Diagraph of KPIs

The final step in phase III is the MICMAC analysis. The objective of MICMAC analysis is identifying and analyzing KPIs based on their driving power and dependence towards strategic agility. According to the dependence and driving ranks achieved from the previous step, MICMAC analysis classified the KPIs into four clusters: *autonomous*, *dependent*, *linkage*, and *driving*. The results are shown in Figure 4.

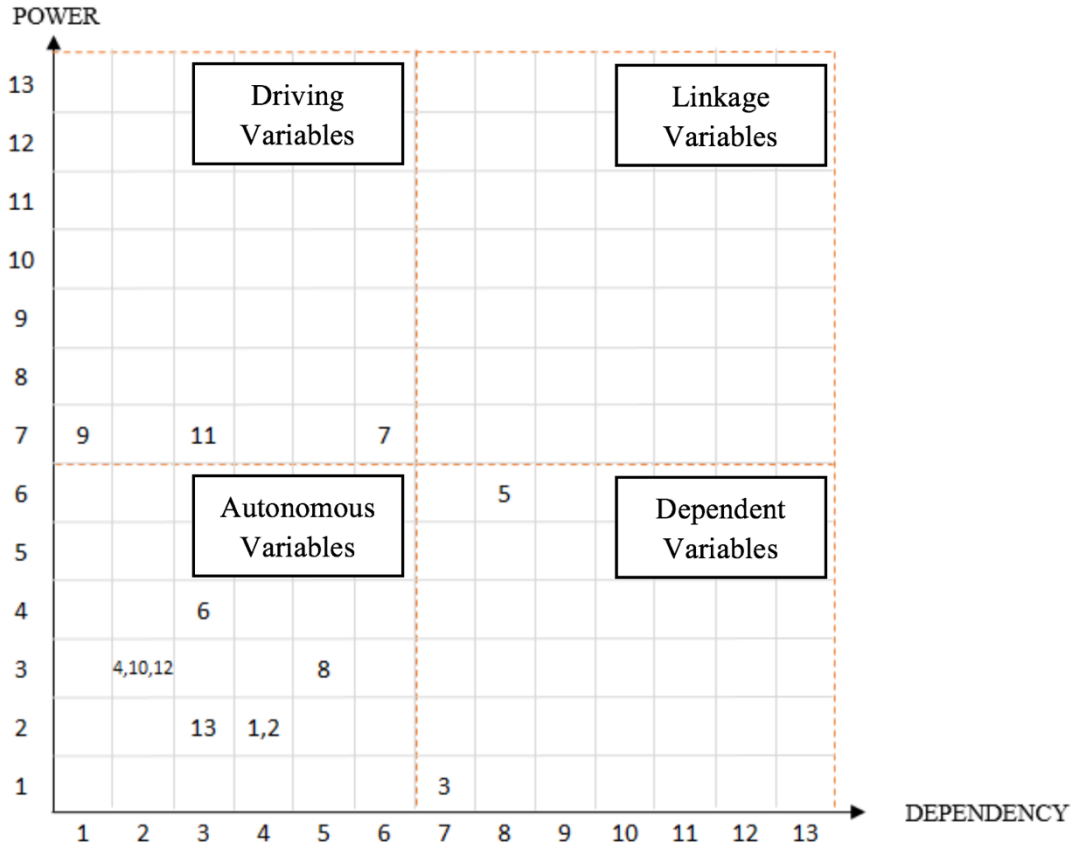


Figure 4: MICMAC Analysis of KPIs

MICMAC analysis shows that KPIs 1, 2, 4, 6, 8, 10, 12, and 13 are autonomous KPIs with both low driving power and dependence and therefore, can be excluded from the analysis. Hence, the model is restructured with the remaining KPIs. The final model is visualized in form of a diagraph as shown in figure 5. A similar process of ISM and MICMAC analysis was conducted to find the intra-relationships and to shortlist agility attributes, agility enablers, and improvement paths. The agility attributes of this study were adopted from Yusuf et al. (1999). That study proposes a comprehensive taxonomy of agility attributes including 32 agility attributes classified under 10 decision domains. As for agility enablers, the ones proposed by Bottani (2010) were used for the ISM model. The improvement paths were contextually developed based on the internal discussion of organizational experts. For the sake of succinctness, we suffice to the presentation of MICMAC analysis and final ISM models[1]. Figure 6a, 6b, and 6c depicts the MICMAC analysis of agility attributes, agility enablers, and improvement paths, respectively. Figure 7a, 7b, and 7c shows the final ISM diagraph of agility attributes, agility enablers, and improvement paths, respectively. The agility indicators in the final diagraphs (figure 7) were used as the inputs of the HOQs in the next phase.

[1] The SSIM, reachability matrices, and iteration tables for agility attributes, agility enablers, and improvement paths are available upon demand from the corresponding author.

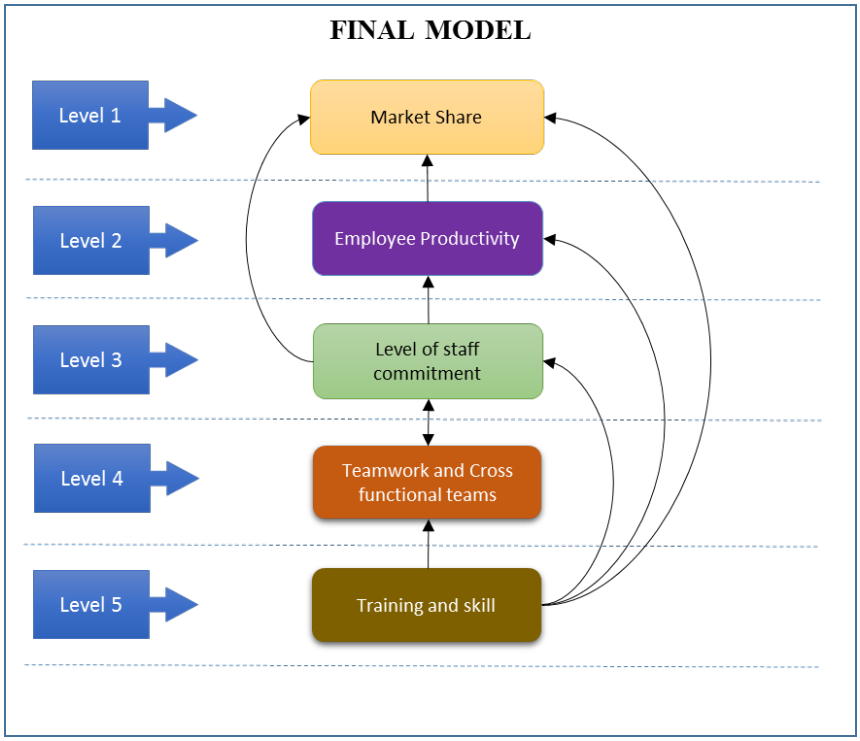


Figure 5: Final ISM Diagraph of KPIs &

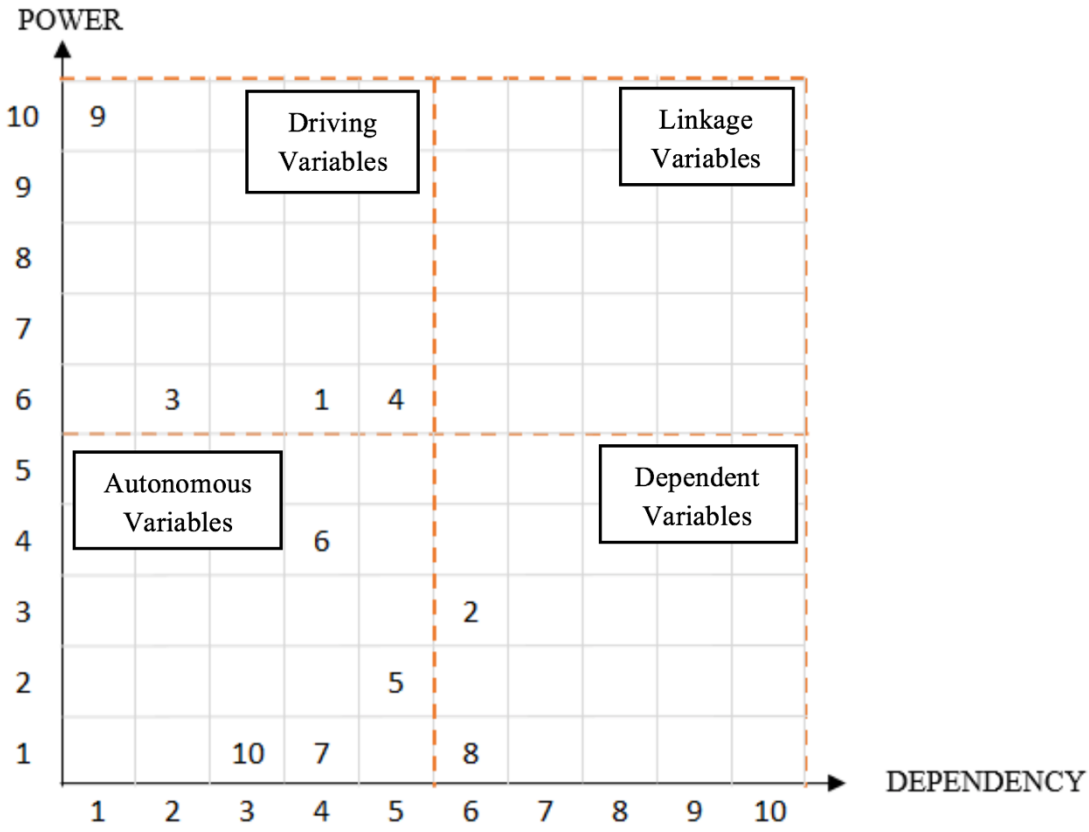


Figure 6a: MICMAC Analysis of Agility Attributes &

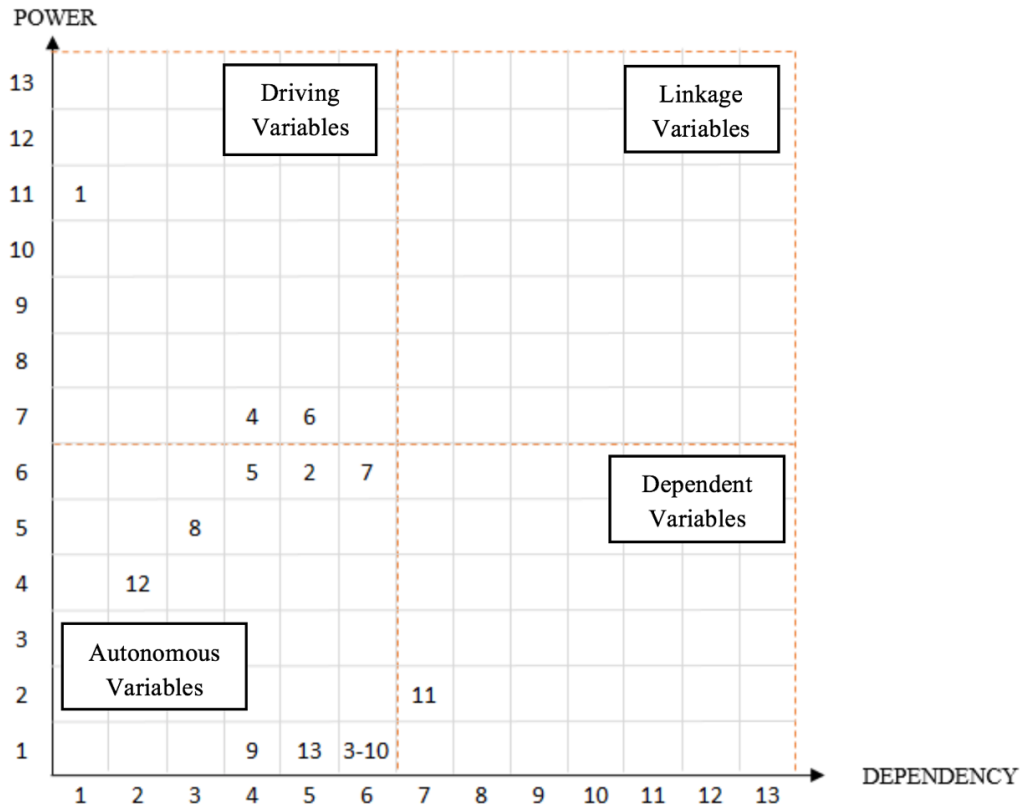


Figure 6b: MICMAC Analysis of Agility Enablers &

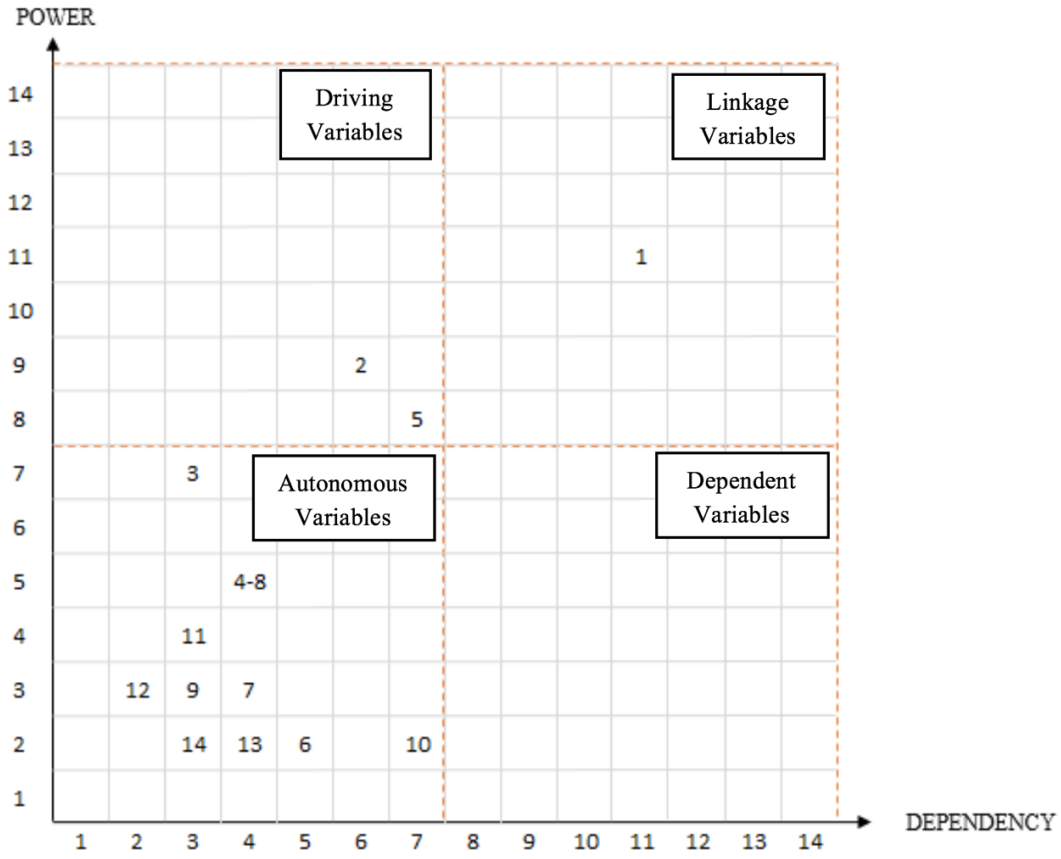


Figure 6c: MICMAC Analysis of Improvement Paths &

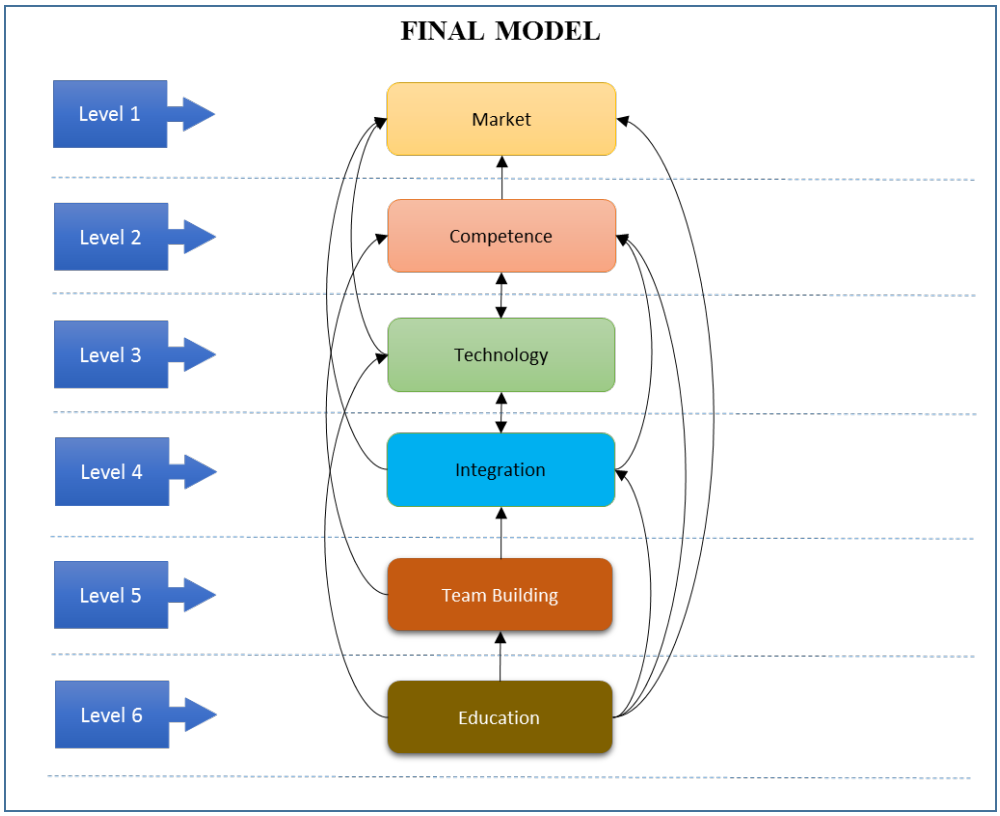


Figure 7a: Final ISM Diagraph of Agility Attributes &

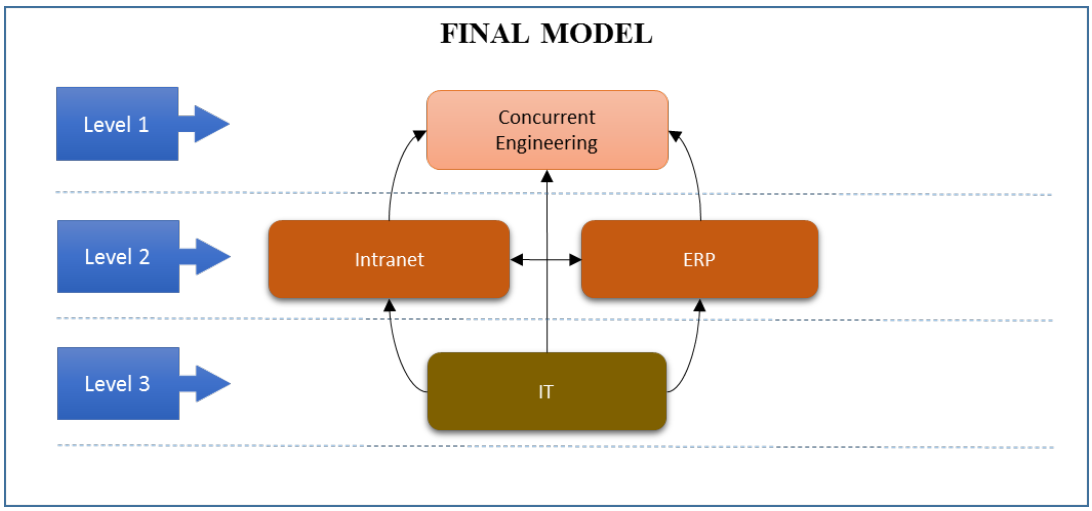


Figure7b: Final ISM Diagraph of Agility Enablers &

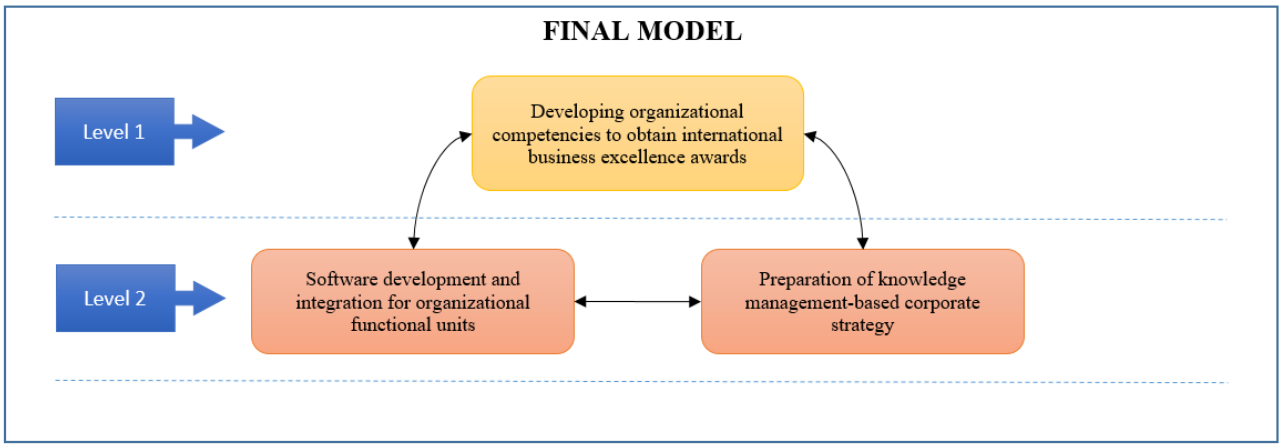
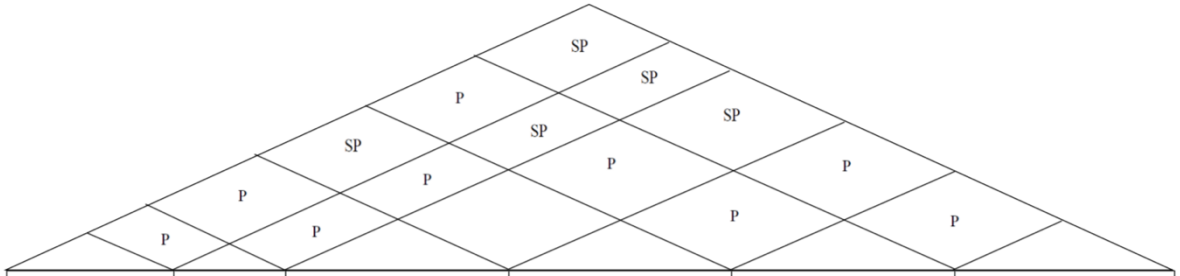


Figure 7c: Final ISM Diagraph of Improvement Paths

4.5. Phase IV: Inter-Connections among Indicators and Finding the Best " Improvement Paths "

The identified agility indicators in the final ISM model of phase III were used as the inputs of HOQs in phase IV. Phase IV aims at identifying the inter-relationships among the agility indicators in order to find the improvement paths that contributes the most to the strategic agility of the organization. The first step in phase IV is assigning weights to the KPIs selected through ISM to be used in the first HOQ. A fuzzy screening technique was used as follows. The criteria for weighting were derived from Sharifi and Zhang (2001) including responsiveness, competencies, flexibility, and speed. The respondents of fuzzy screening were limited to the MD, CFO, and CD. First, they were asked (through questionnaire 3) to assign weights to criteria based on Yager's linguistic quantifiers (Yager, 1996). Next, they assigned weights to each KPI under each criterion using Yager's linguistic quantifiers. Then, an optimistic and a pessimistic approach were used to derive the score of each KPI under each criterion for each expert. For each respondent, his/her results of optimistic and pessimistic approaches were combined to achieve the final weighting of KPIs. Finally, the zone-VP assigned weights the importance of each respondent. His weightings were used as the basis for the aggregation of respondents' weightings.

The weighted KPIs were inserted into the first HOQ as *Whats* and the selected agility attributes were inserted as *Hows*. Next, the inter-relationships between the KPIs and agility attributes were assessed as explained in Nejatian et al. (2018). The resulting HOQ is presented in Figure 8. Table 5 shows the output of the HOQ as a ranked list of agility attributes together with the crisp score and the decision domain they belong to.



		Integration			Competence		Team building				Technology				Market				Education			
Critical Success Factor (CSF_i)	**Weight (W_i)**	Concurrent execution of activities	Enterprise Integration	Information accessible to employees	Multi-venturing capabilities	Developed business practice difficult to copy	Empowered individuals working in teams	Cross functional teams	Teams across company borders	Decentralized decision making	Technology awareness	Leadership in the use of current technology	Skill and knowledge enhancing technologies	Flexible production technology	New product introduction	Customer-driven innovations	Customer satisfaction	Response to changing market requirements	Learning organization	Multi-skilled and flexible people	Workforce skill upgrade	Continuous training and development
Market share	(5, 7, 9)	**W**	**W**		**S**	**S**	**M**	**W**	**W**		**S**	**S**	**W**	**S**	**S**	**S**	**S**	**S**	**M**	**W**	**W**	**W**
Employee productivity	(5, 7, 9)		**W**	**M**	**M**		**S**	**M**	**M**	**M**	**W**	**M**	**M**			**M**		**M**	**M**	**S**	**S**	**S**
Level of staff commitment to the aims of the organization	(5, 7, 9)	**M**	**W**	**S**			**S**	**M**	**W**	**M**	**W**		**M**				**M**	**M**	**M**	**W**	**M**	**S**
Training and skill	(3, 5, 7)	**M**		**W**	**M**	**S**	**S**	**W**		**W**	**W**		**S**	**W**			**M**	**M**	**S**	**M**	**S**	**S**
Teamwork and Cross functional teams	(3, 5, 7)	**S**	**M**	**W**	**W**	**M**	**S**	**S**	**S**	**W**			**M**	**M**					**M**	**M**	**W**	**M**
RI_j		(4.50, 11.00, 20.90)	(0.90, 2.50, 13.00)	(5.00, 11.50, 19.50)	(5.90, 13.00, 22.30)	(6.50, 14.50, 20.90)	(12.70, 27.50, 38.30)	(5.10, 12.00, 24.40)	(3.60, 8.50, 18.70)	(3.00, 7.00, 16.80)	(3.50, 7.00, 16.50)	(5.00, 10.50, 15.30)	(6.00, 14.50, 27.20)	(4.40, 9.50, 16.00)	(3.50, 7.00, 9.00)	(5.00, 10.50, 15.30)	(5.90, 13.00, 20.20)	(7.40, 16.50, 26.50)	(7.50, 18.00, 30.80)	(5.30, 12.00, 24.20)	(7.10, 15.50, 27.10)	(10.00, 21.50, 32.60)
$Score_j$		(19.14, 104.10, 259.89)	(15.54, 95.60, 251.99)	(19.64, 103.60, 258.49)	(21.41, 106.15, 265.59)	(22.01, 107.65, 264.19)	(21.67, 90.55, 202.39)	(14.07, 75.05, 188.49)	(12.57, 71.55, 182.79)	(11.97, 70.05, 180.89)	(6.62, 61.45, 168.33)	(8.12, 64.95, 167.13)	(9.12, 68.95, 179.03)	(7.52, 63.95, 167.83)	(7.22, 64.55, 172.19)	(8.72, 68.05, 178.69)	(9.62, 70.55, 183.59)	(11.12, 74.05, 189.89)	(21.66, 83.70, 204.66)	(19.46, 77.70, 198.06)	(21.26, 81.20, 200.96)	(24.16, 87.20, 206.46)
Normalized values		(0.07, 0.97, 11.81)	(0.06, 0.89, 11.45)	(0.07, 0.96, 11.74)	(0.08, 0.99, 12.07)	(0.08, 1.00, 12.00)	(0.08, 0.84, 9.20)	(0.05, 0.70, 8.56)	(0.05, 0.66, 8.30)	(0.05, 0.65, 8.22)	(0.03, 0.57, 7.65)	(0.03, 0.60, 7.59)	(0.03, 0.64, 8.13)	(0.03, 0.59, 7.63)	(0.03, 0.60, 7.83)	(0.03, 0.63, 8.12)	(0.04, 0.66, 8.34)	(0.04, 0.69, 8.63)	(0.08, 0.78, 9.30)	(0.07, 0.72, 9.00)	(0.08, 0.75, 9.13)	(0.09, 0.81, 9.38)
Crisp values		**121.81**	**114.68**	**121.33**	**124.83**	**125.38**	**101.29**	**88.17**	**84.62**	**83.24**	**74.46**	**76.29**	**81.51**	**75.81**	**77.18**	**80.88**	**83.58**	**87.28**	**98.43**	**93.23**	**96.16**	**101.26**

Figure 8: The First HOQ Presenting the Inter-Relationships between KPIs and Agility Attributes

Notes: S, strong; M, medium; W, weak; SP, strong positive; P, positive; N, negative; SN, strong negative

Table 5: Ranking of Agility Attributes based on the First HOQ &

Rank	*Agility Attributes*	*Decision Domain*	*Crisp Score*
1	Multi-venturing capabilities	Competence	*125*
2	Developed business practice difficult to copy	Competence	*125*
3	Concurrent execution of activities	Integration	*122*
4	Information accessible to employees	Integration	*121*
5	Enterprise Integration	Integration	*115*
6	Empowered individuals working in teams	Team building	*101*
7	Continuous training and development	Education	*101*
8	Learning organization	Education	*98*
9	Workforce skill upgrade	Education	*96*
10	Multi-skilled and flexible people	Education	*93*
11	Cross functional teams	Team building	*88*
12	Response to changing market requirements	Market	*87*
13	Teams across company borders	Team building	*85*
14	Customer satisfaction	Market	*84*
15	Decentralized decision making	Team building	*83*
16	Skill and knowledge enhancing technologies	Technology	*82*
17	Customer-driven innovations	Market	*81*
18	New product introduction	Market	*77*
19	Leadership in the use of current technology	Technology	*76*
20	Flexible production technology	Technology	*76*
21	Technology awareness	Technology	*74*

The second HOQ identifies the inter-relationships between agility attributes and agility enablers. The weights of agility attributes were estimated through dividing the fuzzy scores of each attribute by the score of the first agility attribute (both obtained from the first HOQ). Then, the agility attributes were inserted as *Whats* and agility enablers as *Hows* into the second HOQ and the inter-relationships between them were calculated in a similar way to the first HOQ. The second HOQ is shown in Figure 9. It shows that *intranet connection*, with the crisp score of 64, is the most important agility enabler, followed by *information technology* (63), *enterprise resource planning systems* (49), and *concurrent engineering* (21).

			P	P	
				SP	P
Agile Attributes (AA_j)	**Weight (W_j)**	Concurrent Engineering	Information Technology (IT)	Intranet Connection	Enterprise Resource Planning (ERP) systems
Concurrent execution of activities	(0.07, 0.97, 11.81)	**S**	**S**	**S**	**M**
Enterprise Integration	(0.06, 0.89, 11.45)		**S**	**S**	**S**
Information accessible to employees	(0.07, 0.96, 11.74)	**W**	**S**	**S**	**M**
Multi-venturing capabilities	(0.08, 0.99, 12.07)	**M**	**M**		**W**
Developed business practice difficult to copy	(0.08, 1.00, 12.00)		**W**		
Empowered individuals working in teams	(0.08, 0.84, 9.20)				
Cross functional teams	(0.05, 0.70, 8.56)	**M**			
Teams across company borders	(0.05, 0.66, 8.30)		**W**	**W**	**W**
Decentralized decision making	(0.05, 0.65, 8.22)			**M**	**S**
Technology awareness	(0.03, 0.57, 7.65)		**S**		
Leadership in the use of current technology	(0.03, 0.60, 7.59)		**S**	**S**	
Skill and knowledge enhancing technologies	(0.03, 0.64, 8.13)		**S**	**S**	
Flexible production technology	(0.03, 0.59, 7.63)		**M**		**W**
New product introduction	(0.03, 0.60, 7.83)	**M**	**S**	**W**	**M**
Customer-driven innovations	(0.03, 0.63, 8.12)		**S**	**W**	**M**
Customer satisfaction	(0.04, 0.66, 8.34)		**M**		**M**
Response to changing market requirements	(0.04, 0.69, 8.63)		**M**	**W**	**M**
Learning organization	(0.08, 0.78, 9.30)		**S**	**M**	
Multi-skilled and flexible people	(0.07, 0.72, 9.00)		**W**	**W**	**W**
Workforce skill upgrade	(0.08, 0.75, 9.13)		**M**		
Continuous training and development	(0.09, 0.81, 9.38)		**S**	**S**	
RI_k		(0.10, 2.11, 35.26)	(0.45, 9.29, 133.85)	(0.29, 5.59, 84.94)	(0.16, 3.79, 70.30)
$Score_k$		(0.10, 3.78, 77.72)	(0.54, 12.65, 228.45)	(0.43, 11.43, 231.41)	(0.16, 8.25, 179.69)
Normalized values		(0.00, 0.30, 144.23)	(0.00, 1.00, 423.95)	(0.00, 0.90, 429.43)	(0.00, 0.65, 333.45)
Crisp values		**21.35**	**63.57**	**63.67**	**49.09**

Figure 9: The Second HOQ Presenting the Inter-Relationships between Agility & Attributes and Agility Enablers &

Notes: S, strong; M, medium; W, weak; SP, strong positive; P, positive; N, negative; SN, strong negative

Finally, the third HOQ explicates the inter-relationships between the agility enablers and the improvement paths. The weights of agility enablers were estimated in the same way as the weights of agility attributes in the second HOQ. Next, agility enablers were entered into the third HOQ as *Whats* and improvement paths as *Hows*. Figure 10 illustrates the third HOQ. Based on the results, *software development and integration for organizational functional units* with the crisp score of 298 is the first improvement path, followed by *developing organizational competencies to obtain international business excellence awards* (104) and *preparation of knowledge management-based corporate strategy* (96).

Agile Enablers (AE_k)	**Weight (W_k)**	Software development and integration for organizational functional units	Preparation of knowledge management-based corporate strategy	Developing organizational competencies to obtain international business excellence awards
			P	
Concurrent Engineering	(0.00, 0.30, 144.23)			
Information technology (IT)	(0.00, 1.00, 423.95)	**S**		**M**
Intranet connection	(0.00, 0.90, 429.43)	**S**		
Enterprise Resource Planning (ERP) systems	(0.00, 0.65, 333.45)	**S**	**M**	
RI_d		(0.00, 2.56, 1186.83)	(0.00, 0.33, 233.42)	(0.00, 0.50, 296.76)
$Score_d$		(0.00, 2.56, 1186.83)	(0.00, 0.48, 381.80)	(0.00, 0.60, 413.47)
Crisp values		**298**	**96**	**104**

Figure 10: The Third HOQ Presenting the Inter-Relationships between Agility Enablers and Improvement Paths

Notes: S, strong; M, medium; W, weak; SP, strong positive; P, positive; N, negative; SN, strong negative

5. Discussion and Research Synthesis

This section discusses the findings from the application of our proposed methodology and compares the findings with the literature. Starting from the ranking of KPIs achieved at phase II, most KPIs in the first quartile belong to the BSC perspective *learning and growth*, while the KPIs related to *internal processes* appeared just at the end of the second quartile and were generally ranked low. This highlights that despite the overriding importance of issues such as employee training, commitment, and productivity, a gap exists between the current status and the desired level of these KPIs. On the other hand, the organization is performing efficiently with respect to its internal processes. The inclusion of KPIs related to the internal environment of the organization through learning and growth is in line with the literature asserting that strategic agility not only addresses the changes in the external environment of organizations but also entails responding to internal challenges (Ivory and Brooks, 2018).

Coming to the results of phase III, the final ISM model of KPIs reveals that almost all the KPIs belong to the perspective *learning and growth* emphasizing again that assigning resources to the betterment of employees has the highest driving power on other KPIs in achieving strategic agility. Interestingly, the MICMAC analysis of agility attributes (Figure 6a) show that *education* and *team building* were found as the agility attributes with the highest driving power and lowest dependence, both of which contribute to employees' learning and growth. The results of the third ISM (Figure 7b) denote that IT, intranet connection, and ERP systems are the most impacting agility enablers, all of which pertain to information systems at the organization. It can be interpreted that the organization is *enabled* in achieving strategic agility through investment in information systems. The ISM results are beneficial for managers by directing them towards indicators that bear the strongest intra-connection with other indicators of the same category.

Moving to phase IV, the first HOQ shows that the learning and growth-related KPIs are best satisfied by agility attributes pertaining to competence, integration, and team building. For example, by *developing business practices difficult to copy* (competence) or *making the information more accessible to employees* (integration), the organization can contribute to the growth of its employees. In order to enable such agility attributes, the second HOQ suggests that the intranet connection and IT infrastructure should be improved. The third HOQ suggests that the best *path* to satisfy the agility enablers and achieve strategic agility is development of internal software for the main organizational units and its integration.

Taking both intra- and inter-relationships into account, the predominant causal flow found from the implementation suggests that in order to improve strategic agility, relevant information system capabilities should be developed with regards to employees' learning and growth. Generally, this finding is in keeping with the extant literature which asserts information systems enable firms to be more strategically agile (Ravichandran, 2018). However, assigning resources blindly to information systems without proper identification of inter-relationship between the information systems areas and strategic

agility indicators might act as an impeding factor on the way of strategic agility (Panda and Rath, 2016). The influence of IT on strategic agility is contingent upon organizational environment and information characteristics being translated into appropriate agility indicators (Mao et al., 2015). The application of our proposed method clearly pinpoints the right IT-related indicators which positively impact on and interact with other indicators to propel the organization towards strategic agility. Moreover, the prominence of information systems indicators and prioritization of their variations in agility attributes, agility enablers, and improvement paths facilitate exploring current IT capacities while exploiting potential IT capabilities and resources. Such IT ambidexterity, found through the implementation of the methodology, was shown to enhance strategic agility through improving organizational and operational ambidexterity (Lee et al., 2015).

Overall, the agility indicators and their intra- and inter-relationships identified by the empirical investigation have large overlaps with the findings of the previous studies such as Tseng and Lin (2011) and Nejatian et al. (2018). Moreover, the diversity of agility indicators pertaining to different perspectives of the organization confirms the literature stating that agility can be achieved only through a whole strategic commitment (Appelbaum et al., 2017a) and integrated consideration of agility indicators (Vázquez-Bustelo et al., 2007).

6. Conclusions

Theoretical Contributions: This paper contributes to the literature of agility by proposing a systematic methodology to achieve and enhance strategic agility through identification of agility indicators and establishing the intra- and inter-connections among them. The methodology is novel in three ways. Firstly, organizations contending to improve strategic agility frequently encounter a plethora of agility indicators and the complexity of relationships among them. The main challenge for managers is identifying the key indicators since investing organizational resources on inappropriate indicators can even hinder strategic agility. By the same token, agility literature suffers from paucity of research that investigate the relationship dynamics among agility factors (Fayezi et al., 2017). The proposed methodology of this paper addresses the complex dynamics by establishing intra- and inter-relationships and pinpointing the critical few agility indicators to which assigning resources will eventually lead to the maximum improvement in the overall strategic agility of the organization.

Secondly, it addresses the limitations of previous methodologies (Bottani, 2009, Nejatian et al., 2018) in analyzing the intra-relationships and dealing with large number of agility indicators. Thirdly, the methodology makes a decent contribution in addressing organizational ambidexterity (Charles A. O'Reilly and Tushman, 2013, Birkinshaw and Gupta, 2013) due to its capability in analyzing incompatible or mutually exclusive agility indicators and selecting the ones which result in exploring current competencies while exploiting future opportunities.

Practical Contributions: The paper makes strong practical contributions by proposing a pragmatic methodology and presenting a full implementation in a highly competitive industry. Strategic managers and organizational leaders can benefit from the proposed methodology for their organization. We highlight the importance of phase I in achieving relevant results and recommend practitioners to include the KPIs which are more specific to their operating context. Furthermore, we assert that in the absence of systematic methodologies, it would not be possible to directly choose the right agility indicators solely based on experience or managerial insight. As shown in phases III and IV, agility indictors are highly interrelated and human mind would not be able to analyze the complexity of such interrelationships as the number of indicators increase (Saaty & Shang, 2014). A structured methodology would help practitioners by eliminating the subjectivity from the process of decision-making and link strategic agility to the root indicators that would otherwise seem unrelated or trivial.

The methodology is applicable to improve the strategic agility of different organizations. The results, however, may differ based on the industrial or geographical context of application. For example, the dominance of indicators related to IT and technology systems in our findings can be due to the application of the methodology in a developing country with inadequate infrastructure, while the application in a more developed country could have resulted in the identification of other types of agility indicators.

Limitations: The study involves several limitations. First, the methodology is applied to a single organization with a specific market environment. In order to verify the *reflectiveness* of the methodology, i.e. applicability in multiple settings, further studies in other contexts is required. Second, while the key indicators were identified, the study does not involve post-measurement of strategic agility in the organization to verify the effectiveness of the methodology. Longitudinal or follow up studies are required to confirm the improvement of strategic agility and identify any bias in the long-term.

Third, the methodology assumes that organization needs to be strategically agile without measuring the initial need to agility. Such an assumption might not be valid in organizations focused on high-efficiency (lean) competing based on lower prices where rapid response to changes is not a priori. Estimating the initial need to strategic agility using methods such as the one proposed by Zhang and Sharifi (2000) is recommended. Finally, due to scarcity of studies on context-specific agility indicators, especially pertaining to the food industry, development of KPIs by another group of experts for the same organization as the case of this paper, would result in different KPIs.

Future Research: Several avenues of research are open to future methodological studies of strategic agility. Some future directions have already been suggested to address the limitations of the study. Moreover, future research is needed to collate sectoral agility indicators. Hitherto, most of the reviews and synthesis of agility indicators were either general or pertain to manufacturing sector. Specific sectors such as fast-moving consumer goods (FMCG) or health and humanitarian aid where agility is a prime concern need to develop their own agility indicators. The proposed methodology can be applied to other industries and the results can be compared with the ones of this study.

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