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**Investigating the use of innovative dynamic capabilities
from a structuration perspective: A study of automotive
innovation project**

**A Thesis submitted to the Management School, The University
of Sheffield, for the degree of Doctor of Philosophy**

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Dedication

To my parents and my wife.

Acknowledgements

The current research project details my lengthy and laborious PhD journey. The fundamental components, theoretical insights, methodological approaches, empirical findings and expected contributions to knowledge are attributable not only to my research objectives, but also to other influential individuals engaged in my PhD journey. Family, supervisors, friends and interviewees all formed the basis of my personal and professional relations that positively impacted the accomplishment of this doctoral research. In what follows, each specific group of PhD companions and supporters is acknowledged.

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Abstract

The way in which organisations encounter the environmental, technological and innovative fluctuations in the era of market dynamism provides an opportunity to review their growth, survival and failure. Observers found that the fine line between the success and failure of such organisations essentially pertains to their capacity to manage innovative dynamism in their business environments. As a consequence, organisations realised that the development of dynamic capabilities is crucial for their innovation and technological changes. Dynamic capabilities have been conceptualized as a mechanism for addressing turbulent business environments through assisting organizations to extend, amend and reconfigure existing operational capabilities to fit within these environments. Dynamic capabilities have been theoretically investigated in the last decade with interest in the strategic management field and how to inject new vigor into empirical research. However, none of these studies has considered the role of complementarity between action and structure while developing new innovations or maintaining existing ones and the role played by the innovative dynamic capabilities in either constraining or enabling such complementarity.

As the issues of action and structure are considered to be fundamental research domain in the field of innovation process, this thesis investigates the use of innovative dynamic capabilities in the development of innovation projects from a structuration perspective. I adopt structuration theory as a framework within which to integrate the perspective of dynamic capabilities with innovation as a complementary field, in order to understand how the activities related to the processes of dynamic capabilities are structurally implemented in the development of innovation projects. I also conceptualise two distinct

types of innovative dynamic capabilities: protective and destructive. The latter type enables change in the existing innovation projects and their associated rules, facilitates, agents and actions, and the former acts as a constraint to such change. As a consequence, two promising research gaps – the need to investigate empirically dynamic capabilities in a combination with a complementary field and to understand and investigate dynamic capabilities through the dualism between structure and action – are addressed through providing empirical evidence via integrating the findings of a semi-longitudinal case study with this thesis’s theoretical accounts, which are dynamic capabilities, structuration and innovation. Finally, the contributions of the thesis to knowledge and its practical implications, in addition to a summary of its fundamental findings, limitations and suggestions for future research are all presented.

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Chapter One: Introduction

1.1 Preface

This chapter establishes the objectives of the research project, which is undertaken to identify the mechanism in which innovative dynamic capabilities as an agency are used and how they positively impact the development of innovations within the manufacturing firms. It is necessary at the beginning to set the scene for this research by providing a general overview of dynamic capabilities and shedding light on current status. The research aim as well as questions must be also presented to provide structure. Therefore, the identification of the research questions is explained and explored within the context of the conceptual insights of this research. The research focus, which is understanding the use of innovative dynamic capabilities from a structuration perspective (Giddens, 1976, 1979 & 1984) also detailed. Easterby-Smith, et al. (2012) made the suggestion that the need to disseminate the information recorded is an obligation of the researcher to the wider community. Therefore, the specific values of the current research are highlighted in the chapter. The chapter also briefly emphasises the unit of analysis related to the current research. Easterby-Smith, et al. (2012) also identified the need for an appropriate structure to be developed so that the requirement of the research is set out at the outset. A detailed structure of this thesis is provided.

1.2 Setting the scene: an overview of dynamic capabilities

In the current research, it is necessary to emphasise that dynamic capabilities are examined as the contributor to the creation, transformation and recombination of resources (Teece, et al., 1997). In the current literature, there are diverse views explaining the perspective of dynamic capabilities. Therefore, in examining the perspective of

dynamic capabilities, it is relevant to take into account diverse dimensions. This can be done through understanding various factors including the conceptualisation, development, functionality and the typology of dynamic capabilities. The significance of this is attributable to the fact that comprehending the institutional and organisational factors and the effects associated with each conceptualisation of dynamic capabilities can lead the researcher to adopt the conceptualisation that fits best his own research. Dynamic capabilities are discussed within this research project according to how they create, modify and extend the resources of firms structurally utilised for a clear purpose, represented in developing innovation projects. Consequently, the definition of Helfat, et al. (2007, p. 1) that sees dynamic capabilities as “the capacity of an organisation to purposefully create, extend, or modify its resource base” is adopted in this research to define dynamic capabilities from a structuration perspective.

It is also relevant to understand the context of innovation in terms of the dynamic capabilities of the innovating firms. In particular, companies whose competitive edge stems from their constant investment in innovation and technology should develop or build dynamic capabilities (O’Connor, 2008). Danneels (2002) in his analysis of new products also emphasised the interrelation between dynamic capabilities and innovation, asserting that companies, notably those that are characterised by innovative behaviours, can be seen as portfolios of capabilities, not portfolios of product innovations. This indicates that capabilities including dynamic ones are contributors to the process of innovation development/extension. The available literature also suggests that the barriers to innovation during the firms’ attempts to develop new products are more prevalent in smaller firms in comparison with larger firms. It is evident the superiority of these large

firms in terms of static capabilities (mainstream) and dynamic capabilities at the expense of their small counterparties. Moreover, Van Geenhuizen (2010) identified that dynamic capabilities are those resource-based changes that allow innovation. Zhou and Wu (2010) stressed that innovation is a critical element for firms particularly in turbulent environments where change is required and a necessary component for a sustainable competitive advantage. Innovation and sustainability have become synonymous as major concerns in the twenty-first century business environment. Recently, Barrales-Molina, et al. (2012) found a critical connection between technical innovation and dynamic capabilities. They found that “the more innovative the firm is, the more it possesses dynamic capabilities” (p.585).

1.3 The research focus and approach: Investigating dynamic capabilities from a structuration perspective in combination with innovation

In identifying the research focus, it is necessary to adopt the perspective of innovative dynamic capabilities in dynamic firms. The perspective of dynamic capabilities concerns different notions that lead to diverse standpoints. However, in the current research, it is investigated from a structuration point of view within the area of innovation. The focus of this research is specifically placed on investigating the reliance on dynamic capabilities as an agency, while developing innovation projects in dynamic manufacturing firms. This focus investigates how such reliance can be attained through the dualism between social structure, as represented in rules and facilities/resources, and agents' actions. Such investigation is pivotal given the fact that business environments have changed significantly over the last years and it has been necessary for firms to be more innovative in order to retain their position in their respective industries. Therefore, understanding

dynamic capabilities through the dualism between the resources and rules that facilitate and govern innovation development/extension processes on the one hand and the actors' actions on the other hand can be key for ensuring constant innovation flow in firms whose business is focused on science.

The identification of the gaps in the relevant literature is a necessary step prior to explaining how they can be filled. After extensive exploration of dynamic capabilities in the context of structuration and innovation, two important gaps were detected. One such gap – the need for empirical investigation of dynamic capabilities in combination with a complementary field – is addressed through integrating the perspective of dynamic capabilities with innovation. This is justified by the fact that innovation and dynamic capabilities are linked; some authors consider product innovations as dynamic capabilities (e.g. Danneels, 2002), while others believe that dynamic capabilities result in the creation of innovative-based capabilities (e.g. Ellonen, et al., 2011). It is also justified by the fact that the theoretical framework within which I investigate dynamic capabilities (structuration theory) is prevalent in innovation research (Pozzebon & Pinsonneault, 2005) and strategy research (Jarzabkowski & Whittington, 2008). The other gap is the need to understand dynamic capabilities through the dualism between structure and action. This gap is addressed by adopting structuration theory in explaining the processes of dynamic capabilities and categorising two types of innovation-based dynamic capabilities: protective and destructive.

In addressing the above gaps, this research adopts Giddens' (1976, 1979 and 1984) structuration theory and Sztopka's (1991) theory of social becoming as well as other structuration-based theories and innovation-based theories of Hung (2004), Schumpeter

(1934 and 1942) and Malerba, et al. (1997). This is to perceive the roles, which are played by individuals within firms, specifically, how they search for and use dynamic capabilities in innovation projects. The research also attempts to understand how do the engines behind these roles (the rules that inform them and the resources that facilitate them) in fact impact the development of innovation projects. The focus then is extended to clearly recognize what influences the implementation of the activities associated with learning, reconfiguring, leveraging, coordinating and integrating and energizing processes of dynamic capabilities. Is such implementation only determined by what a firm possesses in terms of technological capabilities, expertise and knowledge? Or is it also determined by other impact factors like signification, domination and legitimation? The current research adopts the theories mentioned above to explain the importance of the interplay between agency and social structures in defending existing innovations, roles and facilities and dominant corporate agents or destroying them all. Therefore, there is requirement to define the dynamic capabilities, which are required for developing/extending innovations from a structuration perspective, as **an agency in which actors draw on their perception of the external structure of their firm and their own knowledge of their roles (internal structure) to create, reconfigure, leverage, coordinate, integrate and energize the resource base of their organization with the objective of initiating or adapting to change.**

The explanations of the dualism between social structure and human actions, by which manufacturing firms utilise dynamic capabilities in developing, extending and destroying innovation projects, form the basis of the current investigation. The overall aim is to: *'Comprehend the mechanism by which manufacturing firms use innovative dynamic*

capabilities to develop, maintain and destroy innovation processes/projects from a structuration perspective'.

This aim leads to two research questions:

- **How do manufacturing firms structurally develop, maintain and destroy innovation processes/projects through the reliance on innovative dynamic capabilities?**
- **What distinguishes the protective innovative dynamic capabilities of manufacturing firms from their destructive innovative dynamic capabilities?**

1.4 Significance of the research

This research is considered to be significant in relation to the use of innovative dynamic capabilities in manufacturing firms. In identifying the significance of the research, four main values must be highlighted in reference to dynamic capabilities. First, it is important to investigate the use of dynamic capabilities and the associated processes from a structuration perspective. This is to provide the existing literature with socially-based explanations of how the activities related to the processes of dynamic capabilities are implemented, which represents a new way of understanding dynamic capabilities. Second, the current study relies heavily on structuration and innovation-based theories/perspectives in extending knowledge of dynamic capabilities through suggesting two distinct types of innovative dynamic capabilities associated with the continuity and change aspects of structuration process. The suggestions regarding the identification of a new process of dynamic capabilities, represented in the energizing of slack resources, can also be appreciated. Finally, in response to the call of dynamic capabilities scholars, integrating other fields including innovation as a complementary field can undoubtedly

add a specific value to the present study. This chapter discusses the significance of the research according to the four main values that have been identified.

1.4.1 Dynamic capabilities from a structuration perspective

As regards the first value, this study is to the best of the researcher's knowledge the first empirical investigation of dynamic capabilities from a structuration perspective, in order to understand the dynamic capabilities-based roles that individuals play when developing innovation projects. None of the existing studies of dynamic capabilities has considered the impact that the complementarity between action and structure has on firms' use of dynamic capabilities in developing new innovations, and the role played by these dynamic capabilities in either sustaining or destroying such innovations. As explained earlier, structuration theory incorporates the interplay between social structure and the agency. Therefore, the five processes of dynamic capabilities can be explained according to this theory with the objective of highlighting the structural properties that may enable or constrain the activities associated with each process. In this regard, dynamic capabilities which enable actors to draw on (i) the rules that govern the social context in which they interact, (ii) the facilities available within it and (iii) the perception of their roles to initiate the change or continuity required for the process of developing or protecting innovation projects are considered as a contributor to such a process. This makes structuration theory pivotal particularly in understanding the use and activation of dynamic capabilities within the area of innovation.

1.4.2 Two distinct types of innovative dynamic capabilities (protective and destructive)

The current research offers the opportunity to identify two distinct types of innovative dynamic capabilities: protective and destructive. Both of these types are critical to the concept of innovative dynamic capabilities with one acting as an enabler of the change and the other acting as a constraint. The protective type is a constraint of change as it facilitates continuity in terms of the social structure of the respective entity, and protects its dominant innovations and corporate agents, while the destructive type is an enabler of change as it drives the reconstitution of the social structure, the destruction and replacement of dominant innovations and corporate agents. The significance of conceptualising these types of dynamic capabilities is related to providing those who have critical roles in manufacturing firms within the area of innovation with clear insight into what each type contributes, so that they can proactively perceive the outcomes of activating both types, and thus rationalise their related decisions. As each type is functionally characterised by distinct attributes, decision-makers, planners and managers of manufacturing firms engaged in the development/extension of innovation projects can proactively understand what each type requires in terms of resources and capabilities, so that they can critically assess their stock of resources and capabilities and subsequently adopt the most suitable innovation path (adaptation or creation).

1.4.3 New processes of dynamic capabilities

In examining new processes of dynamic capabilities, it is necessary to discuss the importance of energizing slack resources. Sirmon and Hitt (2003) identified the need to remove decaying resources and detect new patterns that can combine old resources and fully develop dynamic capabilities through this method. It is important to note that other

resources apart from old resources can hamper the development of dynamic capabilities. Chiu and Liaw (2009) suggested that new resources could prove to be an obstacle particularly if they are unused and require a sort of recovery prior to being used. The conceptualisation of energizing slack resources as a new process of dynamic capabilities has a theoretical impact as it breaks down the traditions; Teece, et al. (1997) identify learning, reconfiguring, leveraging and coordinating and integrating as the four exclusive constituent processes of dynamic capabilities.

1.4.4 Integrating dynamic capabilities with innovation as a complementary field

The concept of dynamic capabilities is quite complex. Therefore, an important objective of the current research is to reduce the diverse interpretations of dynamic capabilities through integrating innovation as a complementary field. The choice of innovation is rational enough; according to Teece, et al. (1997), the processes of dynamic capabilities and innovation are interrelated. The need to merge innovation with the perspective of dynamic capabilities results from the fact that the literature on innovation comprises diverse insights into the technical innovation audit (Chiesa, Coughlan & Voss, 1996), the new product development process (Clark & Fujimoto, 1991), R&D and the implementation of production innovations (Voss, 1988), but only a few insights examining innovation from the perspective of dynamic capabilities. In merging dynamic capabilities with innovation, the impact of dynamic capabilities on the development/extension of innovation projects can be identified. Therefore, the chances of only having a vague understanding of dynamic capabilities are reduced.

1.5 Dynamic capabilities within the context of automotive firms

A number of empirical studies have contributed to the literature on dynamic capabilities since the early research by Teece and Pisano (1994). Many concentrated on electronic-based firms: Lee (2011) investigated the dynamic capabilities of Samsung within the area of semiconductors; Harreld, et al. (2007) investigated the dynamic capabilities at IBM; and Roy and Roy (2004) investigated the dynamic capabilities stemming from the merger of HP and Compaq. Firms in other industries have not attracted comparable interest from dynamic capabilities researchers, especially those that operate within the automotive industry, as only very few studies (Camuffo & Volpato, 1996 and Knight & Collier, 2009) have been conducted. On account of the lack of empirical data and other reasons pertaining to accessibility, I was encouraged to consider an automotive innovation project as the unit of research analysis.

I decided to investigate a firm within a single industry in order to eliminate context-specific differences that can exist between firms from different industries (Eisenhardt, 1989). Furthermore, such single focus can enhance my understanding of the automotive context. A robust contextual understanding is a necessary requirement for a researcher intending to investigate change (Pettigrew, 1990) and capabilities which in fact are likely to be context-specific (Ethiraj et al, 2005). Moreover, research on a single automotive case enabled me to spend adequate time in examining the complicated social and contextual processes of that case as Yin (2003) suggested. The automotive industry is worth being investigated as it is the industry that produces “the machine that changed the world” (Womack et al, 1990) and is the industry that witnessed a string of innovative and

technological changes which resulted from the considerable number of mergers and acquisitions that have recently occurred within it (Gomes, et al, 2010 & Gomes, 2009).

1.6 Thesis structure

This research project is structured into six chapters. In addition to **Chapter 1**, **Chapter Two** presents a critical literature review in which I explore the perspective of dynamic capabilities from its roots, explaining its connection to the resource-based view and theorising further areas. I also review relevant research on structuration theory and innovation. In **Chapter Three**, I discuss philosophical and research approaches, research strategy, data analysis and the data generation methods of the current research as well as methodological information associated with the case under study. In **Chapter Four**, a semi-longitudinal case study is structurally developed according to the critical incident technique. In **Chapter Five**, the theoretical accounts developed in **Chapter Two** are integrated with the related materials of the case developed in **Chapter Four** for the sake of providing the empirical evidence that supports this research's theoretical insights. In **Chapter Six**, the current research's contributions to knowledge are explained and the practical implications presented. **Chapter Seven** provides a summary of the key findings by explaining how two fundamental questions have been addressed and provides an overview of the study limitations and its implication for future research.

1.7 Chapter summary

In this chapter, it was necessary to set the scene for the research, which is required to attain its overall aim, which is *'to comprehend the mechanism by which manufacturing firms use innovative dynamic capabilities to develop, maintain and destroy innovation processes/projects from a structuration perspective'*. Therefore, an overview of dynamic

capabilities was presented at the outset of the chapter. The chapter then explained the focus of the current research, which is mainly the need to investigate dynamic capabilities from a structuration perspective and to integrate this with the complementary field of innovation. The section was designed to explain the focus of the current research and to outline the overall aim and two questions. The chapter also explained the theoretical and practical significance of the current research by investigating dynamic capabilities from a structuration perspective, conceptualising two types of innovative dynamic capabilities, conceptualising a new process of dynamic capabilities and integrating dynamic capabilities with another field. The chapter then emphasised the unit of research analysis, and concluded with an outline of the different research stages.

Chapter Two: A Comprehensive Review of Innovative Dynamic Capabilities in Dynamic Firms

2.1 Preface

The concept of dynamic capabilities obviously refers to an object that is characterised by its dynamic and animated nature. The literature of this concept is not in reality excepted from this dynamic nature since it has been stuffed with several notions, leading to diverse perspectives and standpoints. Proceeding from disparate epistemological positions, each researcher has contributed to boosting the degree of variation in understanding the conceptualization, the development, the functionality and the typology of dynamic capabilities and comprehending the effect imposed by institutional and organizational factors on building and using these dynamic capabilities. The current literature of the dynamic capabilities concept predominantly conceives the use of dynamic capabilities in the form of creating, modifying and extending the resources of firms due to the need for innovation and the existence of market dynamism. In this chapter, I decided to espouse an identical approach while theoretically reviewing the concept of dynamic capabilities within the area of innovation owing to some considerations concerning the nature of the industry in which I aim to empirically investigate this research's enquiries which is the automotive industry.

To assure comprehensiveness in perceiving the concept of dynamic capabilities, I was taking into consideration reviewing the complete literature of dynamic capabilities as much as possible. This was accomplished via categorizing the studies conducted on dynamic capabilities and the associated research based on the time of issue, to make certain that the study that was conducted in one particular decade is grouped with its counterpart studies conducted in the same decade. The rationale behind this is to retain me committed to the entire literature with no exclusion. Additionally, and more importantly, I was determined to accurately observe the theoretical evolution that has occurred in the concept of dynamic capabilities, from the fundamental contribution made by Teece and Pisano (1994) until the more recent contributions.

The way in which businesses experienced the environmental and technological changes was an opportunity to review the drive behind the success and the survival of firms in a dynamic business context. In dynamic environments, the fine line between the success and the failure of organizations is fundamentally related to the capability of these organizations in managing dynamism in their respective industries and their ability to constantly show a capability to innovate. This prompted Teece, et al. (1990) to search for a justification that explained the capacity of certain firms to weather the storm of change and constantly producing new innovations. They attempted to scan the organizations internally for the sake of strengthening their awareness of the reason that enables these companies to be accurate in their responsiveness, adaptable in their innovation, and efficacious in managing their resources and capabilities. As a consequence, they came to the conclusion that “our view of the firm is somewhat richer than the standard resource-based view, it is not only the bundle of resources that matter, but the mechanisms by

which firms learn and accumulate new skills and capabilities, and the forces that limit the rate and direction of this process” (Teece, et al., 1990, p. 4). Although this view of the firm was ground-breaking and changed the way we conceive the firm, it only considered the firm’s internal factors as a platform for capturing competitive advantage and neglected the importance of the rules that govern the way in which the firm creates, manages and harnesses its capabilities and facilities to do so. It also neglected the role and the type of agents engaged in creating, managing and distributing such capabilities and facilities. Accordingly, it is important to keep an eye on such roles and their association with the development and use of dynamic capabilities while reviewing the dynamic capabilities literature.

The literature of innovation provides us with some insights on how are previous and existing market dynamisms and transformations (Dosi, et al., 2000; Eisenhardt & Martin, 2000) and supra-normal innovative competences restructuring the existing high-technology firms (Christensen & Raynor, 2003). Relying more on the innovative behaviours and competences of firms at the expense of absorbing and extrapolating technological market dynamisms may hamper the capability of high-tech firms to “maximize their resources and advantages” (O’Connor, 2008, p. 314). I am therefore, interested in investigating the way in which firms capitalize on their dynamic capabilities to create innovative behaviours as well as track the technological change of their markets to ultimately develop the necessary innovative projects. I chose to rely on “structuration theory” of Giddens (1976, 1979, 1984) to understand the roles played by individuals in searching for and developing/extending such innovative projects and explain the way in which they draw on the social structure they belong to for the sake of either defending

their existing innovations or destructing them. This is attributable to the ability of structuration theory in incorporating the interplay between social structure and agency. Additionally, this theory is prevalent and more appropriate for technological change and innovation-oriented research as it enables researchers to conceive the mechanism in which these processes work (Pozzebon & Pinsonneault, 2005).

The main argument here is centred on two fundamentals. Firstly, in an attempt to reduce the diverse interpretations of the dynamic capabilities concept, it was integrated with the field of innovation as a complementary field. Consequently, the main processes of dynamic capabilities suggested by Teece, et al. (1997) were directly interrelated to innovation prior to explaining them from a structuration point of view. Secondly, and from a structuration perspective, I defined the dynamic capabilities that are required for developing innovations as **an agency in which actors draw on their perception of the external structure of their firm and their own knowledge of their roles (internal structure) to create, reconfigure, leverage, coordinate, integrate and energize the resource base of their organization with the objective of initiating or adapting to change**. This eventually provided me with an opportunity to distinctively categorize the innovative dynamic capabilities into two types: protective and destructive. The former acts as an enabler that facilitates the continuity of a firm's or a project's social structure and agents and the latter acts as a constraint that changes that structure and those agents.

This chapter begins with a debate on the theoretical association between the resource-based view and the dynamic capabilities perspective. This is followed by a conceptual explanation of dynamic capabilities. Thereafter, the chapter proceeds to theoretically highlight the theory of structuration. This directs me to examine the concept

of dynamic capabilities, notably the innovative dynamic capabilities from a structuration perspective. As a consequence, two distinct types of innovative dynamic capabilities are distinguished. A distinct type of learning, sensing, seizing and managing, characterizes each type of these capabilities.

2.2 Dynamic capabilities: continuity or shift?

The attempts of scholars to forge a consensus that characterizes the linkage between the concept of dynamic capabilities and the resource-based view appear to have not been conclusive, as their debate still persists and constantly escalates. I deem that asking questions to detect theoretical linkages between the two concepts can be a pivotal step forward for gaining a better understanding of this linkage. The principal question that should be asked is ‘to what extent do the resource-based view and the concept of dynamic capabilities theoretically converge or diverge in connection with the dynamism of both product and factor markets?’ This is in particular significant as some scholars such as D’Aveni (1994) downplayed the ability of VIRN resources to bring in competitive privileges in dynamic markets. This implies that a firm that is operating in a dynamic environment needs more than just having VIRN resources. This need is represented in dynamic capabilities. The current literature provides us with some contributions that illustrate the degree of convergence between the two concepts, and these contributions will be identified and integrated in a comparative manner in the subsequent part.

From a terminological perspective, resources and capabilities are occasionally used interchangeably. Amit and Shoemaker (1993) looked at capabilities as a set of processes used for the utilization of resources. However, when it comes to market dynamism,

functional distinctions can be detected between both terms. Comparing resources and capabilities in a “divisional” order will aid us to perceive the variation between them in relation to their susceptibility to change and upgrading. Resources are claimed to be at the “zero-level” of the hierarchy as they are subject to decay and cannot be upgraded to a higher level of the capabilities hierarchy (Wang & Ahmed, 2007). This immobility deters resources from being a source of sustainable competitive advantages in mutable industries even if they were classed as valuable, rare, inimitable and non-substitutable, as these traits start to liquefy with the passage of time (ibid). The immobility explained above seems to be unnoticeable when it comes to capabilities. Capabilities are supposed to be apt to fast-paced and unforeseen change, and that makes these capabilities able to evolve. Wang and Ahmed (2007) reaffirmed the possibility of a capability to be evolved as they developed a ‘hierarchical’ order of resources and capabilities that categorized capabilities into three evolutionary levels, which are respectively ordered as “capabilities, core capabilities and dynamic capabilities” (Figure 1).

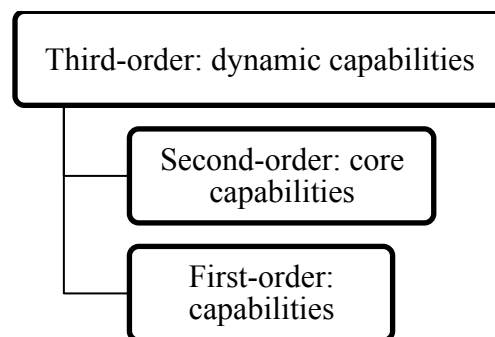


Figure 1: Hierarchy of dynamic capabilities. Derived from (Wang & Ahmed, 2007)

Although the above comparative literature analysis can somewhat guide us to perceive the degree of convergence between the terms “resources” and “capabilities”, it is explicitly limited to one aspect. It only shows us how possible it is to evolve a capability,

whereas this is not the case when it comes to a resource. This encourages me to look at the standpoint made by Barney (1991) to further reveal an essential distinction between the two terms. Barney (1991, p.101) is convinced that a firm's resources are "all capabilities controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness". This conviction, however, seems to be loose as it calls for considering all the firm's possessions such as capabilities, knowledge, competences, assets, organizational processes and learning capacities as resources. As Barney (1991) classified capabilities as a category of resources, asserting that they are an integral part of the valuable resource base that he defined as the resource base that enables a firm to compete today or earn a living in the current time. This is incompatible with the functionality of dynamic capabilities, as dynamic capabilities are characterized by their ability to change a firm over time. This inclines me to rely on the viewpoint of Helfat, et al. (2007) in understanding the term 'dynamic capabilities', which prompts me to see dynamic capabilities as a human activity that prevents a firm from being static. In comparison to what Barney (1991) argued, their argument is centred on dynamic capabilities being processes oriented to influence the resource base for the sake of creating future capabilities.

By adopting the view of Helfat, et al. (2007) in demonstrating the perspective of dynamic capabilities and its linkage with the resource-based view, I can emphasize that unlike resources, dynamic capabilities affect the resource base instead of being a part of it. This corroborates the notion of considering the concept of dynamic capabilities as a shift from the resource-based view rather than an evolved version of it. Such a conclusion is arrived at to stress the dynamism of dynamic capabilities and distinguish it from the rigidity of

the resource-based view. The item of dynamism here is crucial for our core argument (to be presented later on in this chapter) that from a structuration perspective sees innovative dynamic capabilities as a drive that enables the constitution and reconstitution of a social structure and its rules, facilities and agents.

2.3 Defining dynamic capabilities

Although the construct of dynamic capabilities has subsequently been revised and developed after the original contribution of Teece, et al. (1997), a consensus on a precise definition of dynamic capabilities has not been built yet. In this section, I will display a number of definitions of dynamic capabilities based on their chronology, for the sake of observing the shift in defining and comprehending the concept of dynamic capabilities. I will also defend our choice of the dynamic capabilities definition introduced by Helfat, et al. (2007) as the definition that is mostly consistent with our understanding of dynamic capabilities. Teece, et al. (1997) defined dynamic capabilities as “the firm’s ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments” (Teece, et al., 1997, p. 516). Thereafter, Eisenhardt and Martin (2000, p. 1107) deemed that the dynamic capabilities “are the organizational and strategic routines by which firms achieve new resources configurations as markets emerge, collide, split, evolve and die”. In this definition, unlike Teece, et al. (1997), dynamic capabilities were seen as an activity that can be used by a firm to execute something, rather than a specific attribute that can characterize the firm. However, the purpose of dynamic capabilities still remained in the same scope of what Teece, et al. (1997) proposed, as both definitions prompt the reconfiguration of resources.

Griffith and Harvey (2001, p. 598) contributed to the concept of dynamic capabilities by defining them as “the creation of difficult to imitate combinations of resources, including effective coordination of inter-organizational relationships on a global basis that provide a firm competitive advantage”. In effect, this definition does not evidently distinguish the concept of dynamic capabilities from the resource-based view. Similar to the resource-based view, this definition emphasizes the necessity of acquiring difficult to imitate resources, but it does not explicitly address the mechanism in which the existing stock of inimitable resources can be revived in unpredictable business environments (Ambrosini & Bowman, 2009). After a while, Zahra, et al. (2006, p. 918) unprecedentedly defined dynamic capabilities as “the abilities to reconfigure a firm’s resources and routines in the manner envisioned and deemed appropriate by its principal decision-maker”. This view of constituting dynamic capabilities is restricted within the boundaries of principal decision makers, while indeed building dynamic capabilities requires backing from operational capabilities, which are created by those who are responsible for performing day-to-day activities (Pavlou & El Sawy, 2011).

More recently, Helfat, et al. (2007, p. 1) significantly participated in conceptualizing dynamic capabilities by proposing this definition: “the capacity of an organization to purposefully create, extend or modify its resource base”. By virtue of the fact that this definition assumes that the firm’s resource base is set to be maintained in a changeable status and the changes occurring in that resource base are occurring for specific purposes, it should be considered as the definition that - to a large extent - represents the deep meaning of dynamic capabilities. An additional reason for adopting this definition is the fact that, it does not indicate the necessity of experiencing a particular environmental

change to respond to it. It strongly stresses that “a dynamic capability is not an ad hoc problem-solving event or a spontaneous reaction” (Ambrosini & Bowman, 2009, p. 33). The inclusion of the word “purposefully” in the definition suggested by Helfat, et al. (2007) is necessary as a sign of dynamic capabilities’ intentionality (Mintzberg & McHugh, 1985). This definition also denies the role of coincidence and luck factors in developing dynamic capabilities, as it assumes a series of prerequisites in order to develop and use dynamic capabilities. This definition of dynamic capabilities is consistent with the definition provided by Aramand and Valliere (2012) as they emphasize that the process of creating dynamic capabilities is driven by intentional efforts and lasts for a relatively long-term time frame. This definition serves my core argument (to be presented later on in this chapter) for two reasons. First, it explicitly acknowledges the possibility of either creating the resource base of a firm or extending and modifying it. This is consistent with my intention to categorise later on innovative dynamic capabilities into destructive and protective capabilities. Second, the definition’s emphasis on intentionality in capitalising on dynamic capabilities represents a sign of diversity in the purpose of dynamic capabilities. This also supports my decision to categorise the innovative dynamic capabilities into two types (protective and destructive capabilities), each of which serves a distinct purpose. The protective and destructive capabilities will be discussed in detail at an advanced stage of this chapter.

Understanding the functionality of dynamic capabilities can be achieved through reviewing a number of their definitions and explaining the foundations that justify my choice of the definition made by Helfat, et al. (2007), while investigating dynamic capabilities in this research. However, there are still no explanations regarding how do

dynamic capabilities contribute to specific processes, e.g. innovation development by creating, extending and changing the respective resource base and what it takes to enable or constrain the change/modification of that base by dynamic capabilities. Therefore, the theory of structuration is discussed in details within the next section of this chapter, in order to understand and define dynamic capabilities from a structuration perspective with the objective of providing the how explanations mentioned above.

2.4 Structuration theory

The structuration theory posited by Giddens (1984) within the framework of sociology has underpinned the importance and interdependence of agency and structure in social systems including organizations and institutions. In the same vein, other scholars like (Bourdieu, 1977; Archer, 1982 and Sztopka, 1991) developed comparable frameworks which are named with different labels such as the theory of structure, the theory of practice and the theory of social becoming respectively. In his seminal work, structuration theory was first coined by Giddens (1976) and then advanced further by him (1979 and 1984) when he identified structure and agency as the fundamental antecedents of structuration. The work of Giddens (1976, 1979, and 1984) considers structure as both a product of and a constraint/enabler on human action. The theory brings both actors and structure on a duality of structure instead of treating them as separate and opposed. According to Giddens (1984), agents reproduce and transform social structures, and the agency comes into existence as a consequence of social structure. Structuration theory states that ‘knowledgeable actors’ enact structures and actors take considered actions by applying their practical awareness and self-consciousness. This concept underpinning the actors as “knowledgeable” and “enabled” indicates the capabilities of the actors to apply their structurally enabled capacities to result in creative or innovative actions. In what follows, the two ribs of structuration, which are structure and agency, will be discussed in the light of innovation.

2.4.1 Structure and agency

Structure is defined as both the rules that govern the process of structuration and the facilities that are used by human actors to interact and act. The rules are used to identify

the purposes, procedures, interaction between agents and yardsticks of performance within a given social structure (Jones, et al., 2000). As a consequence, these rules impact upon the minds of the actors who are participating in creating and recreating the social structure and influence their actions in each ongoing process of structuration that takes place in a specific period of time. In high technology industries in particular, this is attributed to the contingent status impacted by each innovation and the technological diversity that leads to variations between previously developed and newly developed innovations in terms of function, use and applicability. This explanation is consistent with the explanation introduced by Dosi (1982) when he observed the dominance of a specific “technology paradigm” that entails a new set of rules each time the innovating firm/firms developed a new innovation.

The technology paradigm is divided into two aspects: the artefact that is subject to development and amendment and the set of instructional rules that govern the execution and the commercialization of the artefact (Hung, 2004). In the computing technology industry for instance, three distinct “technological paradigms” with different governing rules were identified (Ende & Dolfma, 2005). From 1900 to 1960, it was the first time that the three ribs of the industry (scientists, engineers and manufacturing firms) had been commanded to simultaneously work in a harmonious pattern for the sake of developing new computing technologies (Nijholt & Van den Ende, 1994 and Ende & Dolfma, 2005). Such rules combined with specific resources or facilities resulted in the emergence of a host of computing technologies (artefacts) in that period such as analogue computers, disk calculators and punch card machines (ibid). From 1960 to 1990, the popularity of digital computers was the salient phenomena in the computing technology industries.

This prevalence of such computers was mainly owing to new different sets of rules such as the orientation of manufacturing to reduce the prices of their new computing technologies, the enhancement of such technologies in terms of speed and storage capacity and the refinement of their size and reliability (Ende & Dolfma, 2005). These rules were pivotal in replacing analogue computers by more mini-computers such as personal computers. Since the period from 1990 until the present, one of the most influential rule in the industry of computing technologies is considered to be the orientation of manufacturing firms to combine computing technology with telecommunications technology in order to create additional uses for computers, which is “the use of computers for communication purposes” (ibid). The development of complementary related infrastructures and further advances in digitalization have resulted in the introduction of new types of computers such as personal digital assistants and notebooks (ibid).

Similar to rules, facilities (resources) represent another element of any social structure. As the impact of competitive governing rules on the structuration process is stressed, the necessity of accessing in-house facilities or resources is also stressed. Giddens made a distinction between allocative and authoritative facilities. He (1984) identified the “allocative and the authoritative facilities” as the two distinct types of facilities that should be mobilized while producing and reproducing a structure. The former type refers to “capability or more accurately, to forms of transformative capacity generating command over objects, goods or material phenomena” (Giddens, 1984, p.33). In contrast, the latter type refers to “types of transformative capacity generating command over persons or actors” (ibid). These two types of facilities determine the mechanism in which

the social structure will be constituted and in which the process will be executed. For instance, a firm seeks to keep full control over its processes and exercise domination is likely to entirely generate the facilities needed for developing new innovations within its own boundaries (Jones, et al., 2000), that it does not require external assistance from other firms. At the other extreme, a firm that is characterized by its openness to others and its reciprocal interaction with other actors for developing new innovations can capitalize on other actors' facilities alongside the facilities that are internally generated. Firms launching their products in markets with high ambiguity and increasing fluctuation usually pursue such an approach, as accessing other actors' facilities provides them with the opportunity to formulate and innovate new technical and technological standards (Liebeskind, et al., 1996). These firms, however, need what is known as "legitimacy" to access such exogenous facilities (Hannan & Carroll, 1992). Firms rely on legitimacy to provide actors with specific norms that illustrate the type of actions and relationships that should be sanctioned. This is because the fact that, firms do not accept all types of inter-firm relationships; they put distinctive assertions on specific forms of relationships (Staber & Sydow, 2002). Hung (2004, p.1489) affirmed that "legitimacy gives firms access to networks that develop between actors following similar formulae or recipes within a technological community". Therefore, legitimacy multiplies the networking choices for a firm and allows its informed actors to access to external facilities according to its own norms. Thus, legitimacy allows the firm to enter a technological community with diverse technological options and paths that exist to magnify the firm's innovation capabilities without breaking the firm's values and norms.

After theoretically elaborating social structure as one fundamental antecedent of

structuration, my focus is now shifting to conceptualize and comprehend agency as another antecedent in order to complement my understanding of structuration. Theoretically, agency is defined as the capability of humans to act (Giddens, 1984). An agent is an individual or a group of individuals with the capacity to exercise an activity (Llewellyn, 2007). Therefore, Sztompka (1991) categorized agents into two categories: individual actors and collective agents. Individual actors are “all kinds of people like customers, employees, managers, shareholders” (Sminia, et al., 2012) who are featured by their specific attitudes, capabilities and knowledge (Sztompka, 1991). Collective agents, meanwhile, are those larger communities in the form of governmental, non-governmental and private sectors that are constituted by individual actors within their organizations and their organizations’ own social structures (Lindkvist & Llewellyn, 2003). Each single social structure influences these larger communities through extracting different interpretative and normative schemes that stress specific meanings during interaction between individuals within an organization, specific governing rules and specific resources and facilities (Jones, et al., 2000). In the following section, I will illustrate the types of agents in the light of innovation by relying on the seminal work of Archer (2000) on corporate and primary agents.

A firm searching for innovation opportunities is required to acquire both the minimum level of organizational competences and competent individual actors necessary for innovation. However, the “knowledge explosion” that makes the volume of new knowledge required for survival in dynamic business industries is relatively large (March, 1999). This is justified the firms’ tendency to engage in collaborative ties that are characterised by the reciprocal diffusion of knowledge and other complementary facilities

between its knowledgeable actors (Daskalakis & Kauffeld, 2007). In such collaborative ties, each firm with a specific social structure may exhibit heterogeneous attitudes (ibid). Therefore, each of them is expected to perform different modes of actions, as some may continue pursuing their regular mode of action (routine activities) and others will either tend to imitate or innovate (Beckenbach, et al., 2012). This implies that a firm exists in an industry where inter-firm relationships are plentiful and almost inevitable is subject to either adapt or change its mode of action while partnering/allying with external counterparts. This task is usually executed by corporate agents, as they are the actors “who personified key roles” (Llewellyn, 2007, p.148). This confirms that two different types of agents (primary and corporate actors) are required to exist within innovating firms.

Primary agents are those individuals with comparable positions, resources and common objectives who take parts in a given collective society (Archer, 2000). Primary agents are therefore highly affected by the social structure that they “are born into and the cultures they inherit” (Archer, 2000, p.262). This suggests that the rigidity of those primary agents that emerges from their inherited culture collides with the openness required for initiating dialogues with other agents outside the boundaries of their own structures. This issue is more problematic for innovative firms who are constantly in search of more novel and diverse innovations outside their own boundaries or at least outside their core areas of competence. These limitations of primary agents and their lack of strategic perception led Archer (2000) to deduce another type of agent (corporate agents) that is characterised by their ability to constitute the cultural and structural context in a way that is consistent with the interests of external agents. Llewellyn (2007, p.136) argued “as there are a

multitude of corporate agency groups, this shaping is not usually completely congruent with the aims of any one constituency”. This induces me to stress the significance of such agents, as a firm survives on interactions with its environment agents to either respond to environmental change or create it. The bearing that the above distinction has on my core argument is represented in that it will pave the way for me to introduce corporate agents as the focal types of agent in the development of innovation when I later categorise the innovative dynamic capabilities into protective and destructive capabilities. Those agents are subject to either maintenance or reconstitution under distinct circumstances that will be explained in depth when I compare the aforementioned types of innovative dynamic capabilities.

2.5 Dynamic capabilities from a structuration perspective

I earlier understood dynamic capabilities as “the capacity of an organization to purposefully create, extend or modify its resource base” (Helaft et al., 2007, p. 1). The word “purposefully” clearly indicates an existence of human intent behind the creation, extension and modification of the resource base. From a structuration perspective, I am convinced that this intent is not only determined by the individual agents/actors who are engaged in the creation, extension and modification of that resource base, it is also determined by the social structure that these actors draw on during their social interaction. This is affirmed by Giddens (1984), who argued that actors constantly rely on the structural properties in their social structure to socially interact. Chiasson and Saunders (2005) also underlined that the actors’ actions are drawn on “scripts” that are derived from their social structures, whereby the actors see these scripts as “recipes” that guide their interaction. Chell (2008) added that these scripts represent the tacit awareness

of the actors towards their social structure. These emphases eventually boost the idea of seeing dynamic capabilities as a human agency that is enabled and constrained by social structure. In what follows, I will introduce and explain the elements of the quadripartite structuration process that are critical to my understanding of dynamic capabilities and I then will precisely define dynamic capabilities from a structuration perspective.

Stones (2005) developed a framework of structuration in which he identified four essential elements of the structuration process. This framework was developed with the intention to support the empirical studies that reckon on structuration theory as it attempts to fractionate the dualism of structure and agency into smaller identifiable elements. The four elements that were identified in his structuration framework are **external structures**, **internal structures**, **active agency** and **outcomes**. Stones (2005) underlined that the actors see the **external structure** as the social context from which they interact and act. It also governs their relationship to each other (Tunstall, 2011). **Internal structure** however, is conceptualized as the actor's own understanding of his roles and the cognition of his position in the context of other actors within the external structure (Stones, 2005). **Active agency** is defined as the sum of ways in which actors habitually or strategically rely on their internal structures (their understanding of their roles) to create actions. These actions will eventually result in specific **outcomes** that take the form of extending, amending and recreating the external structure (Stones, 2005).

The principles of structuration can be applied to dynamic capabilities as they are firm-based capabilities that are developed by specific actors within a specific social structure of a firm to influence the firm's resource base and, thereby, its performance. With the

identification and acknowledgment of the existence of the above four elements of structuration, it is evident that the extension and/or the recreation of the firm's resource base are determined by three of these four elements of structuration, which are external structure, internal structure and active agency. The collective impact of these three elements is illustrated by Heracleous (2006), who emphasized that the actors' knowledgeability and awareness of the rules they draw on in their external structure enable them to determine the way in which they interact and act. By applying these three elements to dynamic capabilities, I can define dynamic capabilities from a structuration perspective as **an agency in which actors draw on their perception of the external structure of their firm and their own knowledge of their roles (internal structure) to create, reconfigure, leverage, coordinate, integrate and energize the resource base of their organization with the objective of initiating or adapting to change**. This implies that dynamic capabilities are enabled and constrained by the social structure of the firm, which can either maintain the firm's existing mode of innovative actions or change it. The adoption of this definition enables us to understand how the actors' interpretations within their social structure inform their actions and comprehend the way in which they recognize and sense their roles. It also enables us to historically track and document how a firm extends or changes its innovations over time according to the status of its social structure and the way in which its actors interact within their social structure and understand and exercise their roles overtime.

When the above definition is analyzed within the broad field of general management, the possibility of its overlapping with other concepts can be noticed. Therefore, it would be more useful to explain it in comparison with the definitions of other general management

concepts such as strategic agility and human resource best practices for differentiation purposes. Regarding the strategic agility, there is a consensus that dynamic capabilities and strategic agility are both critical when encountering market dynamism and accelerating the pace of innovation (Ambrosini et al., 2009; Tichy and Charan, 1989). However, when it comes to the ultimate objective, it is worth noting that firms aim to be strategically agile for the sake of maintaining their competitive advantages since strategic agility is usually defined as a firm's persistent capacity to change its path in order to maintain its competitive advantage (Goldman et al., 1995; Fourné et al., 2014). So, an emphasis is always placed on maintaining a firm's competitive advantage when defining strategic agility. In contrast, my definition of dynamic capabilities specifies the ultimate goal of dynamic capabilities by "initiating or adapting to change". Such a goal differs from what strategic agility aims to attain, as initiating or adapting to change do not necessarily imply the maintenance of the firm's existing competitive advantage. The firm might lose its competitive advantage but still survive in its environment by adapting to change or it might grow in its environment even if it has lost that advantage but managed to create new ones through initiating change. This means that the researcher's conceptualization of dynamic capabilities does not determine their success by the maintenance of competitive advantages. Regarding the human resource best practices, both dynamic capabilities and human resource best practices can impact on firms' performance (Helfat, 1997; Wattanasupachoke, 2009). However, when deeply analyzing such association of the two concepts with the firms' performance, it is worth noting that human resource best practices influence the performance of the firms through mainstream activities as they are usually applied to the areas of turnover, accounting profits,

productivity, workforce planning, training and recruitment (Huselid, 1995; MacDuffie, 1995; Matias and Jackson, 2004; Khan, 2010). In contrast, my definition of dynamic capabilities specifies their impact on the firms' performance by "creating, reconfiguring, leveraging, coordinating, integrating and energizing the resource base of the firms". Above all, both concepts (strategic agility and human resource best practices) are defined without taking into consideration the social dimension. There are no social explanations of how the strategic agility is used and how the human resource best practices are applied according to the complementarity between social structure and agency. This is unlike the researcher's definition of dynamic capabilities that emphasizes how the use of dynamic capabilities is influenced by the duality of social structure and the actors' actions.

2.5.1 A structuration perspective on the core processes of dynamic capabilities

Structuration theory copes with three interrelated structural aspects of processes by which social structures are formed. These are signification, legitimation and domination (Giddens, 1984). Signification structures are symbolic representations that attribute meaning and facilitate communication, legitimation structures focus on norms and values and domination structures involve the ability to control and mobilise facilities and, as such, they relate to power (ibid). Signification and legitimation are associated with the **rules** aspect of structure as they provide the meaning for organizational actions and the legitimacy in which such actions are undertaken as well as evaluated. Domination, however, is associated with the **facilities** (resources) aspect of structure as domination structures are characterised by both material and human facilities. Staber and Sydow (2002, p. 412) emphasised that "rules refer to the signification (This is how we do it in this organization) and legitimation (This is how we should do it) aspects of structure, and

that resources reflect the domination and distribution of power in the system (Who is in charge here?)”. The underlying concept here is that actors provide meaning for their actions via communication and, consequently, they recreate the rules of signification. Actors also rely on power to govern their social structure’s facilities; consequently, they shift their power into domination. They too confer legitimacy on their actions by utilizing norms to sanction them. This is illustrated by Giddens in his framework of the duality between agency and social structure (Figure 2).

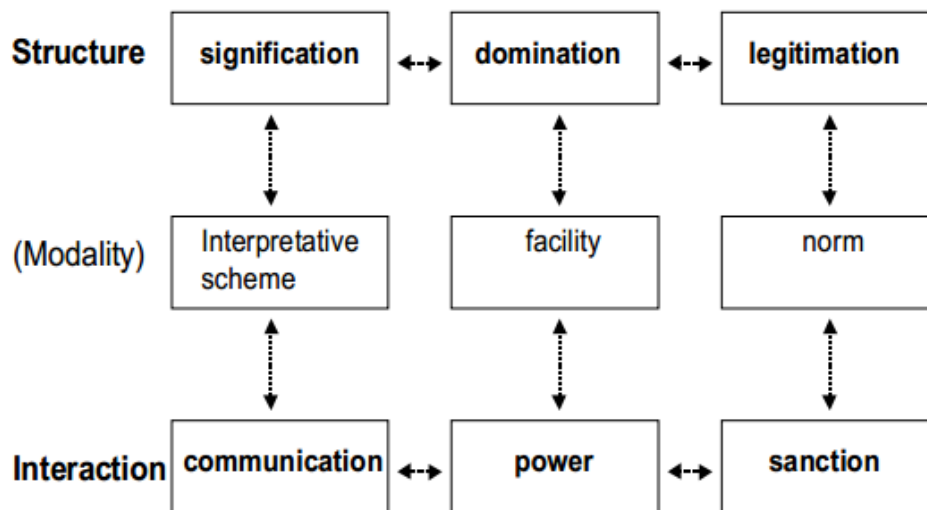


Figure 2: Duality between agency and social structure

Source: Giddens (1984, p.29)

It can be argued that signification, domination and legitimation are also fundamental to the processes that constitute dynamic capabilities as an agency. This is first attributable to the fact that firms/organizations, which are the places where dynamic capabilities are developed and utilized, are in fact social systems and do have social structures. Second,

the literature of dynamic capabilities stresses enough that dynamic capabilities are resulting in extending, modifying and creating the firm's resource base, but it does not illustrate the way in which human actors socially mobilise that resource base. The domination structural aspect of structuration illustrates how these actors rely on power and utilize facilities to govern the available resource base. Third, I previously explained that there are specific purposes and human/managerial intents behind the utilization of dynamic capabilities. By relying on the signification and legitimation structural aspects of structuration, I can understand how the actors make sense of their actions while using dynamic capabilities and how they draw on specific norms to sanction their actions while using these capabilities.

Teece, et al. (1997) identified reconfiguring, leveraging, learning and integrating as the four concurrent processes of dynamic capabilities. These processes exist as constituent parts of the dynamic capabilities. These processes will be firstly illustrated in their broad sense prior to interrelating them to innovation and then elaborating them from a structuration perspective.

2.5.1a Learning

Learning associated with dynamic capabilities is seen as “a process by which repetition and experimentation enable tasks to be performed better and quicker” (Teece, et al., 1997, p. 520). Some scholars classify this learning as individual learning, while others attribute it to the collective learning efforts exerted by the entire organization. For instance, Protogerou, et al. (2011) underlined that although individually produced knowledge is eventually transformed into the organization's knowledge pool and

consequently considered as “organization artefacts”, the origin of this knowledge is essentially attributable to individuals. However, in their explanation of single-loop learning, Argyris and Schon (1978) attached little importance to individual learning in dynamic environments. They believed that the reaction of individuals to change within and outside the boundaries of their firms does only result in one type of learning that “is consistent with what is already known in the organization” (Ambrosini, et al., 2009, p.12). At the other end of the spectrum, when Winter (2003) categorized capabilities based on a hierarchical order, he characterized the learning associated with dynamic capabilities as organizational learning rather than individual learning. This is supported by the argument made by Calantone, et al. (2002), which, underlines that learning is an organization-wide activity. Slater and Narver (1995) also insisted on that organizational learning is a key antecedent of proactively generating new set of knowledge that reflect the status quo of a firm.

After emphasizing the organizational nature of the learning process associated with dynamic capabilities, I will attempt to reckon on the literatures of learning, innovation and dynamic capabilities with the intention of identifying the types of learning processes that are associated with dynamic capabilities. In the existing literature of dynamic capabilities, the conceptualization of the learning process of dynamic capabilities introduced by Teece (1997) and explained above is predominant. However, it needs to be reinforced and divided into two types as learning behaviours and capabilities required for developing dynamic capabilities may vary across firms. The trajectories in which, firms develop “dynamic capabilities may be specific to the firm or the industry” (Wang and Ahmed, 2007, p.38). This implies that the learning type or path that is prevalent or

adopted in a specific industry or a firm do not necessarily apply to the other industries or firms while developing dynamic capabilities. Additionally, as I have earlier highlighted the necessity of intentionality while developing dynamic capabilities, I therefore, emphasize that learning, as a process of dynamic capabilities has to be purposeful and oriented to serve a specific purpose. From a structuration perspective, I deem that the learning is associated with dynamic capabilities is a part of the interaction process of structuration and as the structuration process contains continuity and change, learning in that context has to be oriented to either maintain or change the social structure of the firm. Therefore, I suggest adaptive learning and creative learning as two learning types of dynamic capabilities with two entirely different purposes: the former is associated with continuity and the latter is associated with change. Each type of them will be tied to one distinct type of dynamic capabilities (protective and destructive capabilities) that will be presented and explained at an advanced stage of this chapter.

Prior to explaining the adaptive and creative learning in detail, it is important to understand them within the broad domain of knowledge management. Both types will be used here as generic terms that represent knowledge management processes. They will not be defined from the perspective of a single knowledge management process. Instead, they will be defined by taking into account aspects related to different processes of knowledge management including knowledge creation, knowledge transfer and knowledge application. The reason behind using adaptive and creative learning as generic terms of knowledge management processes is embodied in the fact that scholars use diverse knowledge processes to describe knowledge management. Such processes include, but are not limited to, knowledge creation, knowledge transfer and assembly,

knowledge sharing and integration, knowledge exploitation and knowledge application (Inkpen, 2000). These processes are difficult to separate and are clearly distinguishable in terms of the labelling but not in terms of the underlying concepts (Alavi & Leidner, 2001). Therefore, the adaptive and creative learning are below defined as generic types of learning but in consideration of different knowledge management processes, notably, knowledge creation, knowledge transfer and application.

Firstly, I define the adaptive learning associated with dynamic capabilities as a process in which a firm continuously and evolutionarily learns to attain a quick complementarity between the strategic flexibility of its resource base and the environmental changes within its industry for the sake of achieving its strategic objectives. This definition tacitly involves the processes of knowledge creation, knowledge transfer and application. First, the words “to learn” indicate an amplification activity in which the firm creates a sort of knowledge that enables it to acclimatize its resource base to the environmental changes. Second, the inclusion of “resource base” in the definition indicates the possibility of transferring the adaptation-based knowledge across the entire resource base of the firm. Third, the conclusion of the definition (achieving its strategic objectives) shows that such knowledge is applied to create a specific value, represented in assisting the firm to achieve its strategic objectives.

The adaptive learning paves the way for firms to accumulate to change and exploit emerging market opportunities without the need for dismantling the existing resource base. This is supported by the emphasis made by Martinsuo and Poskela (2011) in which they tied the innovation ability of a firm to its capacity to be adaptive to change, its

capability to learn and its strategic renewal that makes it alert for the future. Additionally, Baker and Sinkula (1999) primarily referred the sophistication of a firm's innovativeness to its learning orientation within change. As a consequence, the development of dynamic capabilities in some innovative firms is highly relied on their adaptive learning, which enables them to observe technical change, amend and enhance the quality of existing innovations and capitalize on technological complementarities through the alignment between the strategic flexibility of their resources and the environmental changes within their industries (Tuominen, et al., 2004). The adaptive learning of dynamic capabilities is below explained in the light of the three aspects of structuration.

The complementarity between the strategic flexibility of a firm's resource base and the environmental changes pertains to the **signification** aspect of structuration and hinges on the rules of the social structure of the firm and the mechanism in which they are interpreted by the actors who interact and communicate to attain this complementarity. Put simply, the actors need to develop a shared mind and interpretative scheme to understand how can they adjust their available facilities and adapt them to the environmental changes. This implies the existence of conflicting actors' interpretations of their own roles in responding to environmental changes and the existence of conflicting actors' interpretations of their social structures' emphases towards these changes result in obstructing the firm's adaptability to change. In relation to the **domination** aspect of structuration, the role of dominant and powerful actors in facilitating the adjustment of the firm's available resources for the sake of adapting to the environmental change is crucial. Powerful actors need to utilize their social structure's facilities to influence other actors and also influence the way in which they interact and relate to each other in a way

that supports the firm's adaptability to environmental change and prevents the actors' resistance of adapting to that change. The actors also need to rely on the norms of the social structure of their firm to evaluate the rules of the **legitimation** that impact the firm's adaptability to change. They might then need to amend the existing rules of legitimation; thereby, the sanction of their actions will be accordingly amended. This means that the mechanisms in which the innovating firm should develop a specific innovation/technology are subject to amendment and, consequently, previous mechanisms may be partially illegitimate. Therefore, the amendment of the legitimation rules is a determinant of the firm's adaptability.

Secondly, I define the creative learning associated with dynamic capabilities as a process by which collective and constant radical learning and entrepreneurial behaviors assist organizations to systematically generate novel thinking that ultimately results in the creation of new product innovations and revolutionary knowledge. Similar to my definition of the adaptive learning, this definition tacitly involves the processes of knowledge creation, knowledge transfer and application. First, the words "to systematically generate novel thinking" reflect a capacity of the organizations to create revolutionary knowledge in a systematic way. Second, the inclusion of the word "collective" in the definition refers to the possibility of transferring the creative-based knowledge generated by the creative learning process to diverse domains of the organizations. Third, the definition's conclusion (the creation of new product innovations and revolutionary knowledge) represents the ultimate outcome of applying the creative-based knowledge.

The above definition of the creative learning is contrary to what some definitions of creativity in the literature suggest. This variation is hinged on two aspects: the classification and the source of creativity. I see the creativity associated with dynamic capabilities as a learning process rather than a trait or a resource. Azadegan, et al. (2008, p.639) argued that “creativity fits much of the requirements to be a resource”. According to their argument, one of the requirements that make creativity a resource is its ability to be fortified against imitation. They therefore, labeled imitated creations as replicas as a sign of their lack of creativity. However, classifying creativity as a resource collides with the essence of dynamic capabilities perspective as the advocates of dynamic capabilities downplay the capability of resources including those that are difficult to imitate in attaining competitive privileges in dynamic environments (D'Aveni, 1994). In another vein, some scholars posited that creativity is mainly sourced from individuals and reside with them (Davis, 1989; Barron & Harrington, 1981 and van Dijk & van den Ende, 2002). They are convinced that it is imperative for an organization to retain its creative employees as long as it is keen to stabilize the level of its creativity; otherwise, its creativity will be exposed to diminishing. On the contrary, in the conceptualization of creative learning I presented above, I emphasize the importance of collectivity in generating new creations. Although I acknowledge the role of entrepreneurial or creative leaders in driving the process of creativity and garnering resources for it (Amabile, 1999), but I also consider their need for another necessary component in order to build creative learning processes. This component is represented in the ability of such creative individuals to influence other individuals who participate in building the creative learning and link their collective efforts to the external environment (Napier & Nilsson, 2006).

Bennis and Biederman (1997) also strongly stressed the necessity of collaborative activities while building creative behaviors in firms. As a consequence, I chose not to attribute creativity building to individuals and attribute it to collective systematic efforts instead. The creative learning of dynamic capabilities is below explained in the light of the three aspects of structuration.

The creative learning that ultimately results in generating the revolutionary knowledge necessary for developing new radical innovations is associated with the **signification** aspect of structuration through the actors' perceptions and definitions of novelty and revolutionary knowledge. Actors may signify and emphasize diverse meanings for these concepts and therefore their firm's creativity can be affected. The existence of diverse and inconsistent meanings of revolutionary knowledge in the actors' minds will eventually lead to hampering the pace of generating that knowledge in their firm. The rules of the external structure of the firm should clearly and continually inform these actors on what is meant by novelty and revolutionary knowledge in order to unify their own perceptions (internal structures) of these concepts while they interact with each other. The critical concern that pertains to the ability of firms to revolutionarily learn and generate revolutionary knowledge lies in the extent to which **dominant actors** use their power to facilitate the creation of new resources that are consistent with and required to generate this knowledge. Dominant actors should understand that their failure to use their power and facilities to develop and allocate new resources required for generating revolutionary knowledge eventually disrupts their firm's creativity. In respect to the **legitimation** aspect of structuration, the generation of revolutionary knowledge exceeds the amendment of the social structure's related rules; as such, it may require the

replacement of these rules by new ones that more foster the creative learning in the firm. This implies that the actors need to draw on entirely new rules to sanction their actions while generating new revolutionary knowledge for the purpose of developing radically new innovations.

To strengthen the theoretical underpinnings that I relied on when defining the adaptive learning and the creative learning and to make certain that my definitions of both processes do not overlap with the definitions of other main concepts, it is important to explain how such processes differ from other comparable organizational learning concepts, notably the exploration capacity and the exploitation capacity. The adaptive learning is not a synonym of the exploitation capacity, nor is creative learning a synonym of the exploration capacity, for a couple of reasons. First, the exploitation and exploration capacities are usually considered as dynamic capabilities in themselves while the adaptive and creative learning processes that I defined earlier are only component parts of dynamic capabilities but not dynamic capabilities in themselves. Yalcinkaya et al. (2007, p. 66) argued that “both exploration and exploitation capabilities are considered dynamic capabilities”. Second, scholars usually tend to link each capacity (exploitation and exploration) to specific types of markets. They limit the use of the exploitation capacity to the stable markets and limit the use of the exploration capacity to the dynamic and emerging markets (Brown & Eisenhardt, 1998; Ancona et al., 2001). In contrast to this, the conceptualization of the adaptive and creative learning processes explained earlier assumes that both processes are used in dynamic markets. The above explanations clarify how the adaptive and creative learning processes differ from the exploitation and exploration capacities.

2.5.1b Reconfiguring

The responsibility of this process is to reconfigure the existent resource base via transforming and recombining a firm's resources (Ambrosini & Bowman, 2009). This has been defined in a more palpable way as "the process which consists of any change in the pattern or degree of interaction between existing and new resources" (Menon, 2008, p. 27). However, the latter conceptualization lacks some accuracy as it always assumes interaction between existing and added (new) resources, while the reconfiguration process does not necessarily encompass the addition of resources. The reconfiguration of resources can encompass adding resources to the current resources, removing the current resources or retaining the current resources (Capron, et al., 1998).

Reconfiguring as a process of dynamic capabilities has been regularly tied to operational capabilities, as many scholars like Teece (2007) and Fischer, et al. (2010) underlined that the reconfiguration process is conducted upon operational capabilities and in the interest of dynamic capabilities. They identified the functionality of the reconfiguring process by preserving competitiveness via promoting, merging, safeguarding and often amending operational capabilities. The exclusion of dynamic capabilities from subjection to reconfiguring collides with a core characteristic of dynamic capabilities, that is, its infinite evolution. Collis (1994, p. 148) emphasised, "the capability that wins tomorrow is the capability to develop the capability to develop the capability that innovates faster (or better)". Therefore, I will include both operational and dynamic capabilities while defining the reconfiguring process.

I see reconfiguring as an opportunity that magnifies the innovativeness of a firm through constantly orchestrating or re-engineering its operational and dynamic capabilities and other resources in line with the fluctuations of the environment where it operates and in line with the processes it internally executes. Reconfiguring is not limited to a specific type of actor within the firm, as both operational and dynamic capabilities are likely to be reconfigured; reconfiguring should be extended to all existing types of the firm's actors, without the exception of a specific type of actor. Tying reconfiguration to innovation is harmonised with the view of Verona and Ravasi (2003), who identified reconfiguration as one of three components required for successful innovation. Besides this, Ellonen, et al. (2009) are convinced that firms with strong reconfiguring capabilities will ultimately exercise "revolutionary innovations". The innovative benefits reaped by companies as outcomes of reconfiguring capabilities and resources are usually derived from two forms of reconfiguring activities that apparently exist in high technology industries, in particular the automotive industry: the relocation of manufacturing units to lower cost economies and mergers and acquisitions (Ambrosini, et al., 2009). With these waves of transferring production units and acquiring activities, firms with dynamic capabilities are challenged to not just reconfigure their operational capabilities, but to reconfigure their dynamic capabilities as well in a way that enables them to acclimatise to the changes occurring in their capability and resource base.

From a structuration perspective, the reconfiguration process should not be limited to the firm's capabilities and facilities; it should also apply to the **signification** of these capabilities and facilities. This is more pivotal if the firm's capabilities and facilities have increased in number as a consequence of merger and acquisition activities or/and are

operating in divergent geographical sites. Actors constantly need to reassign the meaning and value of these capabilities and facilities. They should assign the meaning of their firm's capabilities and facilities based on their interpretations of the norms of signification of their firm's social structure. They need to make sure that the reconfigured capabilities and facilities are consistent with their firm's culture and identity and do not disrupt their firm's capability to create or/and adapt to change. This paves the way for firms to weed out the authoritative and allocative facilities that hamper its creativity and adaptability to change and, thus, its innovativeness. However, this primarily hinges on the support of **dominant actors**, as they are the actors who have the power to weed out these facilities. From the **legitimation** aspect of structuration, those new entrants who exist in the firm's social structure as a consequence of its reconfiguring activities, such as mergers and acquisitions or/and geographical expansion, are not knowledgeable enough of the legitimation rules of the social structure of the firm. They should be informed enough about these rules to sanction their actions according to the norms of the firm's social structure. The geographical distance between the firm's units and subsidiaries that emerges as a result of its reconfiguring activities should prompt dominant actors to generalize the legitimation rules of the firm's social structures so that the new actors who exist in these new units and subsidiaries will be informed enough about these rules.

2.5.1c Leveraging

The role of leveraging in constructing a firm's dynamic capabilities lies in implementing three sub-operations represented in mobilising, coordinating and deploying the firm's resources and capabilities (Sirmon, et al., 2007). I argue that the leveraging process should be limited to mobilising and deploying resources, as the coordinating process can

be appropriately considered as a separate core process of dynamic capabilities owing to some considerations that pertain to its lengthy time scale and its complexity. The mobilising process is accountable for specifying a set of resources and capabilities that are required to bring in competitive advantages in the first instance (Hamel & Prahalad, 1994). This conceptualization of the mobilising process always assumes the existence of capabilities and resources that are capable of bringing competitive advantages, while in fact those capabilities are not equivalent across firms and the markets where the firms that currently and potentially compete are different. Therefore, the mobilising process should develop multiple leveraging strategies to assist firms to accustom themselves with different types of “changeable” capabilities and markets. The mobilising process is followed by a more physical process, which is deploying the mobilised resources and capabilities to ensure the finalisation of leveraging processes (Sirmon, et al., 2007).

I will instead rely on the definition provided by Ambrosini, et al. (2009, p. S11) to define the leveraging process and comprehend its contribution to feed the dynamic capabilities. They defined leveraging as “the replication of a process or system that is operating in one area of a firm into another area, or extending a resource by deploying it into a new domain”. My choice of this definition is justified by two factors: its consistency with the process approach adopted in this research and its ability to provide me with a view on what and why an innovation system or an element of an innovation system were leveraged. Firstly, I will become acquainted with the chronological history of replication and extension activities occurring within a firm, labelling the key outcomes stemming from these activities and observing the amount and the type of individual participants in such activities. Secondly, as Hill and Rothaermel (2003) affirmed that the major

innovation system's objective is to create additional opportunities for growth and prosperity by the leveraging of new technological capabilities, the effectiveness of each firm's major innovation system and dynamic capabilities can be captured in one way by the organizational growth achieved as an outcome of leveraging activities.

To recall, the literature revealed that the ultimate contribution of the leveraging process in developing dynamic capabilities lies in leveraging the characteristic capabilities within or without the organizational borders of a firm in order to chase the hidden opportunities in complex markets (Miller, 2003). This means that leveraging by replicating or extending a firm's resources and capabilities is an attempt to match this firm's distinctive resources and capabilities to the available opportunities in external complex business environments.

From a structuration perspective, the replication of a specific innovation/technology into a new area of the firm and the extension of a specific resource into another area is in fact a historical evaluative process. Actors should be guided by the **signification** rules of their firm's social structure to appropriately assess these innovations/technologies and resources before replicating or extending them into new domains. They need to communicate and find signification from the replication and extension processes, so that they will be fully convinced of the feasibility of the replication and extension processes. Concerning **domination**, the actors' conviction should be however practically expressed through the explicit will of the powerful actors to replicate and extend. Leveraging is facilitated by those actors who have the authoritative power to influence other actors and direct them to participate in the replication and/or extension processes and allocate the required facilitates to enable these processes. The lack of managerial support and

facilities provided by those dominant actors might hamper the leveraging process. Then, the replication of these innovations/technologies needs to be accompanied with the replication of their **legitimation** rules as well. Those actors who participate in the replication process need to realize how should they proceed within the replication process and what actions should be sanctioned while executing it.

2.5.1d Coordinating and integrating

The coordinating and integrating processes are melted in one context as they are deemed to play complementary roles within the development of dynamic capabilities (Menon, 2008). The conjunction of coordinating and integrating is crucial for developing dynamic capabilities as organizations which retain idiosyncratic resources are forced to “pursue greater degrees of coordination and integration, and such an organization may thus develop greater core competencies and dynamic capabilities” (Karim & Mitchell, 2000, p. 1086). Despite the overlapping roles of coordination and integration in the development of dynamic capabilities, these roles are distinguished from each other (Crowston, 1997). The integrating process can be defined as a mechanism in which the integrators of resources including individuals, departments and organizations combine forces to create absolute value (Kleinaltenkamp, et al., 2012). O’Connor (2008) argued that each innovation system, notably the system applied by high technology firms (major innovation system), should be directly linked to the larger system of the firm (the system where mainstream activities such as marketing, sales and distribution are oriented to cater for the needs of current customers). Foster and Kaplan (2001) stressed that the pivotal determinant of a successful innovation system hinges on its ability to be integrated within the larger system of the firm. The effectiveness of the integrating process of the dynamic

capabilities is captured by the extent to which the innovation and the larger systems are geared to preserve the future health of the firm. O'Connor (2008) named senior individuals as the fundamental participants in the integrating process. He attributed that to their ability to think strategically, their detailed vision of the firm's capability's aims in relation to "technology platforms" or "market domains" and their ability to incubate new learning. In contrast, the coordinating process can be defined as a mean to run and manage the dependencies amongst the integrated resources, capabilities or elements for the sake of producing new ways of carrying out a series of activities (Crowston, 1997). These activities can be implemented in the forms of coordinating tasks between the separate functional sections of a firm, the firm and its internal and external technological allies and the different elements of one innovation system, such as coordinating tasks between the engine developers and the electrical engineers while developing a car. The two explanations above elucidate how complementary but different the integration and coordination processes are. The integrating process is more about tying a specific small system to a larger system, while the coordinating process is important in detecting linkages between autonomous or quasi-autonomous units, partners and elements.

From a structuration perspective, the senior actors who are responsible for integrating multiple actors working for different units and firms and are in charge of managing the dependencies among them should refer to the **signification** rules of their firm's social structure to signify specific meanings for their integrating and coordinating actions. They should benefit from their **domination** to facilitate communication between those actors who work in different areas and make sure that each small system including the innovation systems is directly linked to the larger system of the firm where the

mainstream activities are exercised. However, dominant actors are also required not to exaggeratedly exercise their domination and interfere in the core activities of the integrated units, as relative autonomy is required to convince the actors who are working in these units that they are significant assets to the firm. The reliance on the **legitimation** rules to balance between autonomy and dependence while integrating and coordinating between actors, units and firms enables those integrated actors to reflect on their own actions, sanction them and question their legitimacy, thus leading to the dissolution of any invalid actions.

2.5.1e Energizing slack resources

Before detailing the relationship between these processes, it would be important to comment on a missing process in this series of dynamic capabilities' processes. A number of scholars have stipulated the removal of decaying resources or detecting new patterns of recombining old resources in order to develop dynamic capabilities (Sirmon & Hitt, 2003). However, aged or old resources are not the only resources that can hamper the development and use of dynamic capabilities. New resources are also likely to be an obstacle to building and using dynamic capabilities if they are slack or unused, because of the ability of slack resources to inflate the complexity of integrating resources (Chiu & Liaw, 2009). Accordingly, as some organizations are likely to host a bundle of slack resources within their borders, the necessity of energizing these resources is a requirement for developing and using dynamic capabilities.

Geiger and Makri (2006) called for further investigating the influence of organizational slack on the strategic behaviour of organizations. Organizational slack is differently

defined in the literature of strategic management. Nohria and Gulati (1996, p. 1246) defined organizational slack as “the pool of resources in an organization that is in excess of the minimum necessary to produce a given level of organizational output”. Scholars distinguish between two types of organizational slack: available slack and recoverable slack. Available slack occurs when an organization has a bundle of resources that is untapped but ready to use, such as cash available in hand (Geiger & Makri, 2006). Recoverable slack occurs when an organization has a bunch of resources that is considered to be excess costs, as these resources are embedded in the organization and need to be recovered prior to using them, such as redundant employees and machines (Bourgeois & Singh, 1983). The latter is the organizational slack meant in this regard. Given that Geiger and Makri (2006) found that available slack impacts positively on innovation volume, innovation resonance and technology vastness, I would only take into consideration the recoverable slack that is proved to have a negative impact upon the three yardsticks mentioned above.

The above conceptualization of organizational slack leads me to define the energizing process of dynamic capabilities as the firm’s ability to detect new venues for utilizing the organizational recoverable slack resources and capabilities in a way that allows the firm to firstly dispose of the increased expenses of coordination emerging from superfluous resources and secondly accelerate the pace of innovativeness and exploration activities implemented by the firm. This can take the form of directing redundant employees to engage in controlling the firm’s innovation processes for instance. The holders of power at the senior level are the most influential actors participating in energizing the organizational slack as they have the required authority to relocate and allocate resources.

This summarises the notion of energizing as a new and conditional process of dynamic capabilities. This process is conditional upon the existence of slack resources.

From a structuration perspective, the redundancy of knowledge and information increases the time the actors spend in communicating and then interpreting the **signification** of this knowledge and information. They might then signify conflicting meanings for this knowledge and information. The disposal of this surplus knowledge and information will be then a necessity to make actors only concentrate on interpreting the information that is critical to their roles and their firm's core business. The redundancy of employees is not always constructive; it can be exploited by those powerful actors to enhance their **domination** within the social structure of their firm. Those dominant actors may take advantage of this redundancy to develop "coalitions" that serve their own orientation at the expense of the firm's own orientation. Thus, their power will increase and their ability to resist the change will accordingly increase. From another perspective, the power resides within those dominant actors is the only drive behind activating slack resources. So, such power should be exploited in an "ideal" way, not to use it for personal or functional interests and not to restrain it when needed for energizing slack resources while developing a specific innovation. In relation to the **legitimation** aspect of structuration, the redundancy of duties and tasks can impact the actors' perception of their own roles. Those actors can be confused about the legitimacy of their actions as a result of the duplication or redundancy of tasks. These redundant tasks need to be weeded out to in order to keep the actors away from acting in an illegitimate way.

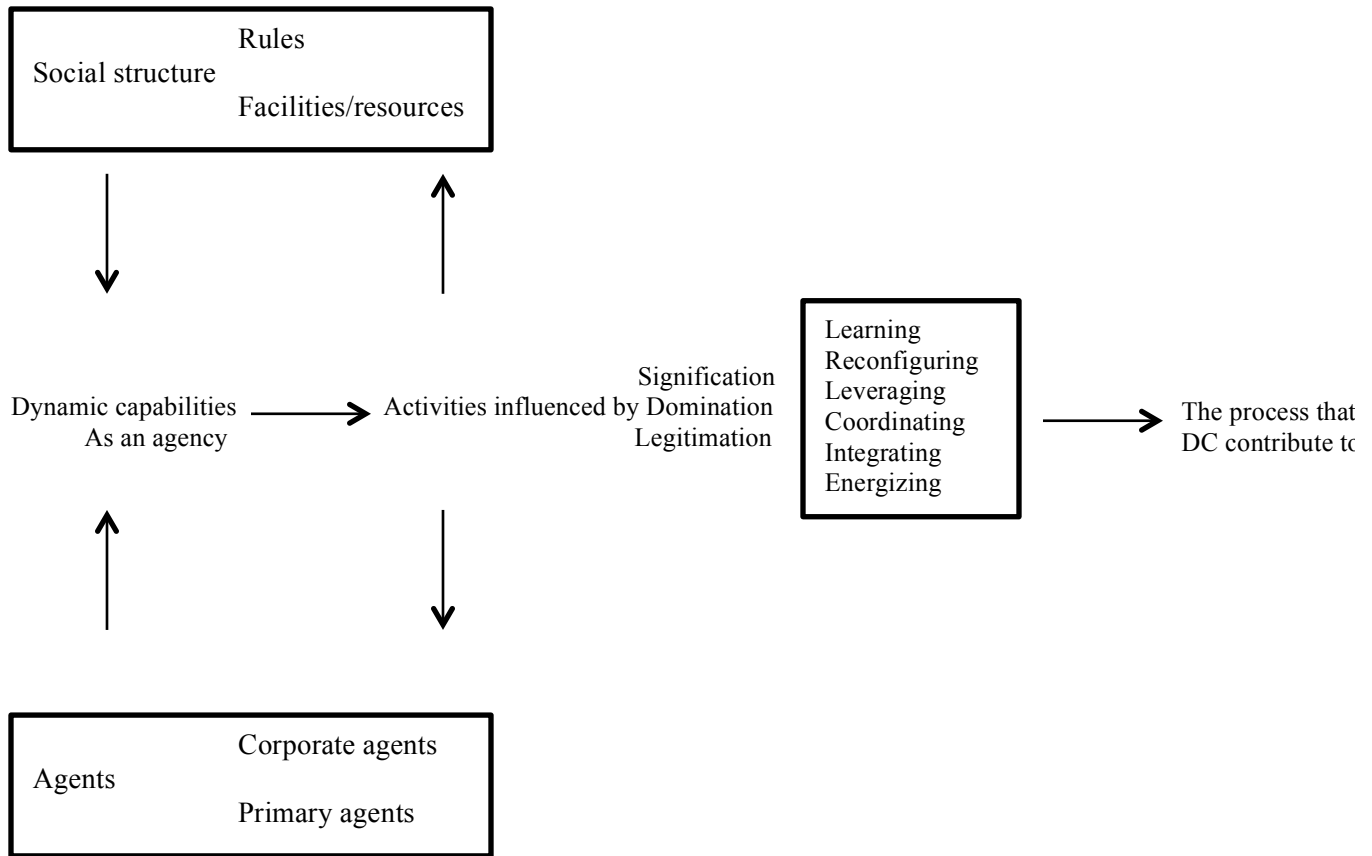


Figure 3: Dynamic capabilities from a structuration perspective

Figure 3 graphically simplifies how dynamic capabilities work as an agency influenced by the structural impact factors of signification, domination and legitimation to contribute to the process of structuration. Dynamic capabilities inform the learning, reconfiguring, leveraging, integrating, coordinating and energizing actions of the respective agents, especially corporate agents, through “scripts” that are derived from their social structure. Therefore, this affects their understanding of their own roles while using and managing the facilities/resources available within the social structure in the process of structuration. Such informing is influenced by signification as well as legitimation factors; thus, the rules (scripts) element of the social structure is particularly affected and also influenced by the domination factor where the facilities/resources element is particularly affected.

2.5.1f Interconnection among the core processes of dynamic capabilities

Controversy rages over the nature of the relationship between the core processes of dynamic capabilities. Menon (2008) used both the terms “concurrent” and “cyclical” to characterise the nature of this interconnection. In this research, I will rely on the literature to examine the reality of this relationship. This relationship can be better described as complementary owing to the evidences presented below.

The interconnection can be featured as a complementary interconnection, as each process can effectively participate in the creation of another process. The complementarity between these processes takes a form of virtuous circle as each process has a specific assertion that would result in favourable outcomes under some stipulations. I earlier explained how such processes are conceptually different; consequently, it is worth now interconnecting these processes in one integrative relationship to maximise their individual contributions. I could advance my understanding of these processes by reconciling the distinct tenor of each processes and elucidating the points of contact between such processes. The conditions required for assuring the positivity of the complementarity between the processes will also be highlighted.

The Learning process is the cornerstone in the development of in-house dynamic capabilities, as it can be seen as an incubator of the cumulative knowledge that reflects on any failure or success experienced by a company (Ambrosini & Bowman, 2009). Learning is often the principal determinant of any reconfiguration activity pursued by firms, owing to its engagement in absorbing, transferring, creating and utilizing knowledge (Pavlou & El Sawy, 2006). The learning process has a direct point of contact

with the reconfiguring process as it harnesses its stock of accumulative and archival knowledge to gear future reconfiguration or renewal. March (1991) argued that a firm tends to exploit what it has already learnt before executing reconfiguring or renewal activities.

The reconfiguring process is usually grounded on three yardsticks, namely, appropriateness (Galunic & Rodan, 1998), timeliness (Zott, 2003) and efficiency (Kogut & Zander, 1996). The appropriateness here refers to the extent to which the reconfigured resources and capabilities will match the external business environment. The timeliness identifies the time frame needed for reconfiguring a set of resources and capabilities. What is meant by efficiency is the ability to reconfigure resources and capabilities in a relatively cost-effective way. These three criteria can provide the individuals accountable for performing the subsequent process (leveraging) with an obvious picture, on which resource or capability can be “replicated” into another area or “extended” into another domain in an appropriate match with the external environment, in a relatively quick time frame and in an efficient way. This can guide them to exclude the resources that are burdening the firm in terms of their inappropriateness to the external environment, the lengthy time frame required for their reconfiguration and the high economic expenses accompanying their reconfiguration before commencing leveraging activities. This clarifies why the reconfiguration of resources is a preparatory step before leveraging those resources (Sirmon, et al., 2007).

Ahuja and Lampert (2001) stressed that leveraging actions represent a pathway through which integrators and coordinators can develop entirely new capabilities through merging

existing elements, systems and resources with other new elements, systems and resources that were previously disconnected. Additionally, Sirmon, et al. (2007) argued that integrating resources is usually the ultimate juncture of each leveraging process. I can refer this to the number of replication and extension activities of resources that usually accompanies the leveraging process. A host of efforts is required to integrate and coordinate such replicated or/and extended resources. In the automotive industry, for example, when a carmaker attempted to replicate a specific navigation system of a specific model into another model, a number of integrating and coordinating activities including communication between the managers of both models and developers are needed to complement the leveraging process.

Energizing is proposed as a conditional process; therefore, it does not necessarily bear from the womb of another process. The interconnection between these processes is graphically depicted in Figure 4.

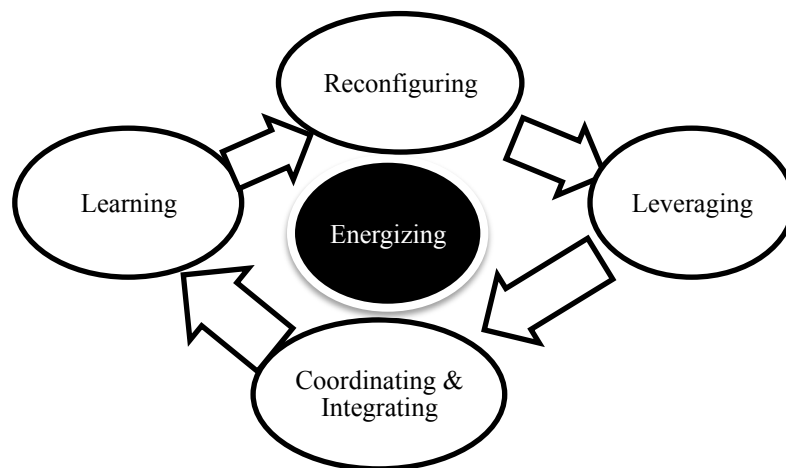


Figure 4: The interconnection among the core processes of dynamic capabilities

Although various conceptual contributions such as (Teece, et al., 1997; Wang & Ahmed, 2007; Menon, 2008 and Ambrosini & Bowman, 2009) endeavoured in different ways to demonstrate the interconnection between the processes of dynamic capabilities, these contributions do not identify whether there should be some specific conditions needed for activating the complementarity between processes or whether the complementarity occurs automatically. I suggested an axial stipulation that seems to be necessary to ensure the favourable outcomes of this relationship. As the relationship between processes encompasses repeated interactions over time, some individuals with specific abilities, resources and interests are required to control and evaluate the repeated interactions occurring between the processes (Bazerman & Shonk, 2001). Mouzas and Ford (2012) underlined that gains are likely to be attained when the actors engaged in repeated interactions are acquainted enough to perceive the broad picture and the connectedness between the sources of the repeated interactions. Therefore, I stipulate that informed controllers and evaluators are seen as a necessity to confirm the quality of the interactions that repeatedly occur between each two processes.

2.6 The dualism of structure and agents in the innovation development

Van de Ven (1986, p.592) argued that “the newness of an idea includes ‘both technical innovations (new technologies, products, services) and administrative innovations (new procedures, policies, and organisational forms)”. Hung (2004, p.1481) also argued that, despite the diversity of agents, their power to innovate is conditioned by “their identification with, and appropriation of the structural context” in which, they interact. This urges me to emphasize that the way in which the agents perform the actions that are necessary for innovation in their daily interactions is relied on rules and resources. In

what follow, I will discuss the model developed by Hung (2004) to bridge the duality between agents' actions and structure while developing innovations. I will also interrelate this with the concept of dynamic capabilities to illustrate what types of dynamic capabilities exist during the innovation development processes. Identifying distinct types of innovative dynamic capabilities is considered to be the core of my argument in this research as it allows me to look differently at innovative dynamic capabilities and associate each type with a specific type of learning, sensing, seizing and managing. Alongside an empirical investigation this can lead towards a potential extension of the perspective of dynamic capabilities.

As an attempt to plug the gap between the agents' actions and the structure in innovation activities, Hung (2004) developed a model of innovation that is seen as a technology path. This model "refers to a particular form of structuration process relying on the recursive relationship between human action and social structure in innovation activity" (Hung, 2004, p.1482). According to this model, each innovation transition is likely to be identified and observed as the technology path (the structure) is constituted, modified and reconstituted by a series of innovation actions that occur sequentially at different times. This implies that the technology path is considerably influenced by the existing transformation between previous and new innovation (Hung, 2004). The newly constituted technology path does not necessarily entail the stick (rules) and the carrot (resources/facilities) of the previous one as Nelson and Winter (1977, p.64) claimed, "There is both a stick and a carrot to drive firms to introduce "better" production methods or products". The model of technology path therefore, claims that the reciprocal association between structure and agents' actions occurs through the compliance of firms

with specific rules that makes their access to the institutional resources necessary for legitimate innovation actions (Hung, 2004). By relying on the theory of creative destruction developed by Schumpeter (1934 and 1942) and the work of Malerba, et al. (1997) on the persistence of innovative activities, these innovation actions are categorized into two groups: destructive and cumulative innovation actions. While the former refers to the action that comprises ground-breaking innovations that can destroy the existing structure and renew the resource base allocated for innovation (Schumpeter, 1942), the latter refers to the type of innovation action that involves innovative amendments, “develops into a cumulative process in which today’s action institutes tomorrow’s structure” (Hung, 2004. p.1483). The cumulative innovation actions preserve the agents executing the process of innovation and safeguard the traditions of their social structure with the possibility of conducting periodical enhancements to that structure. In contrast to cumulative innovative actions, destructive actions constrain the continuity of the agents executing the process of innovation and bring about a change to their social structure.

By linking the above distinction to the definition that I made earlier, which sees dynamic capabilities from a structuration perspective as **“an agency in which actors draw on their perception of the external structure of their firm and their own knowledge of their roles (internal structure) to create, reconfigure, leverage, coordinate, integrate and energize the resource base of their organization with the objective of initiating or adapting to change”**, I can understand that, unlike destructive actions of innovation, cumulative actions could only result in extending or enhancing the resource base of the innovating firm. This confirms that two types of innovative dynamic capabilities drive the development of innovations: protective and destructive. The protective capabilities

are a capacity of firms that allow the extension and/or enhancement of a dominant type of innovation (technological paradigm) through the maintenance of the social structure where the agents belong and interact. These capabilities do not necessarily redefine the governing rules of the structure and renew its resources and facilities; in fact, they defend them. They also do not call for replacing the existing corporate agents whose actions prolong the presence of a particular innovation. In contrast, destructive capabilities are a capacity that enables firms to annihilate an existing type of innovation (technological paradigm) and replace it with a new one that can be seen as a technological breakthrough. Such capabilities enable the destruction of an existing social structure, redefine its rules and renew its resources. Therefore, the destructive capabilities should also be able to replace the corporate agents or entirely change their innovative philosophy each time the innovating firm intends to ruin its innovative traditions and interact differently with its agents or interact with new agents for that purpose.

The development of innovation as a process has involved both continuity and change (Pettigrew, 1990). Continuity in this context refers to the conservation of a specific dominant innovation (technological paradigm), the preservation of the agents behind its development, and the maintenance of those agents' social structure. In opposition to continuity, change demolishes the existing dominant innovation (technological paradigm), reappoints the agents who developed it, and reconstitutes the agents' social structure. Each component of the process (continuity and change) is associated with specific types of innovative dynamic capabilities (destructive and protective) and differently influences the social structure components (signification, domination and legitimation). Continuity is the result of the protective capabilities that preserve the

interpretative schemes used by actors as a modality of interaction in the signification structure, maintain the authorities that specific actors have due to drawing on facilities in the domination structure, and, finally, preserve the existing set of norms that regulate interaction in the legitimation structure. Change, meanwhile, is the result of the destructive capabilities that alter the interpretative schemes of the signification structure that remained in the mentality of the actors for a given period of time, eliminate the existing domination of specific actors in the domination structure due to the reallocation of facilities, and, finally, reconstitute the norms that govern the interaction in the legitimation structure. The following figures (figures 5 & 6) explain the two types of innovative dynamic capabilities.

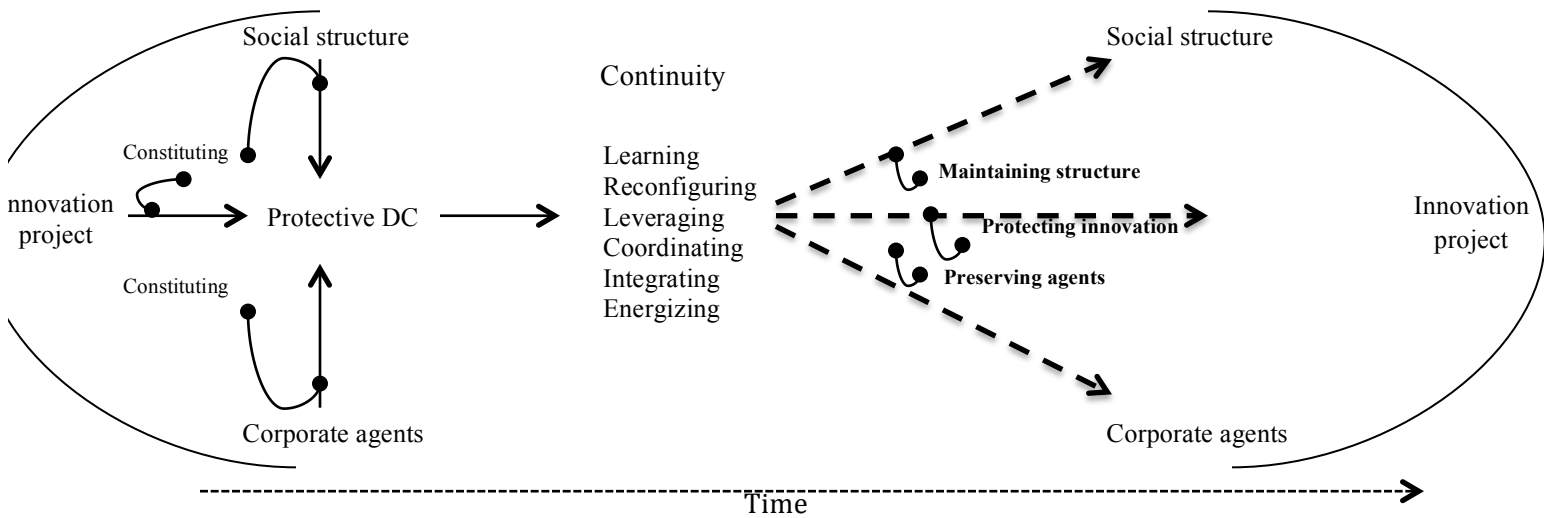


Figure 5: Protective innovative dynamic capabilities

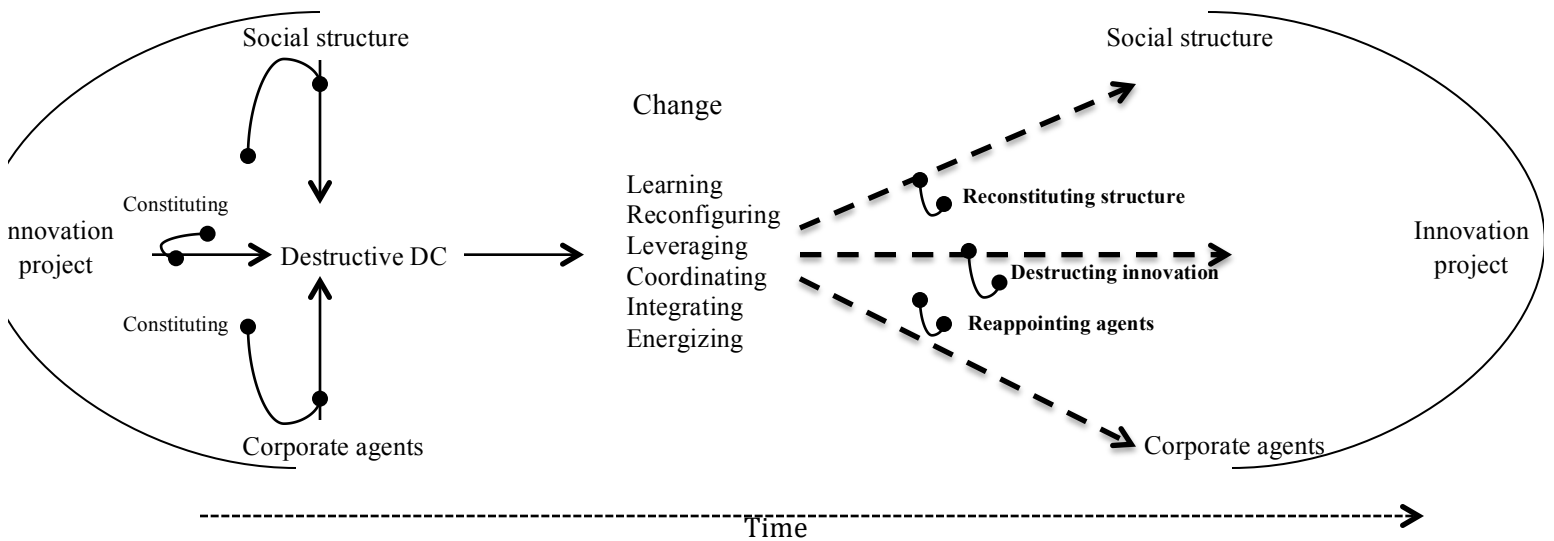


Figure 6: Destructive innovative dynamic capabilities

2.6.1 Learning processes of protective and destructive innovative dynamic capabilities

Earlier in this chapter, when I detailed learning as a core process of dynamic capabilities, I stated that each type of learning process is associated with a distinct type of innovative dynamic capabilities. Previous research on dynamic capabilities did not attempt to categorise the learning process associated with dynamic capabilities; instead it suggested one type of learning that is identified differently. Teece (1997), for instance, emphasised the element of experimentation in his definition, while Ambrosini and Bowman (2009) stressed the element of reflection on success and failure in their definition of learning as a core process of dynamic capabilities. In contrast, I categorized the learning process of dynamic capabilities earlier in this chapter into two types: adaptive learning and creative learning. In what follows, each type of learning is tied to its corresponding innovative dynamic capabilities type and the relationship between them is justified.

As explained before, the protective capabilities call for continuity rather than change as they prolong the life of a social structure and maintain its rules and agents. In order to do

so, such capabilities should comprise a component learning process that is characterised by its adaptability to change rather than its creativity of it. This adaptability entails the reliance on strategic flexibility in response to environmental change in order to exploit a resource base to its maximum instead of recreating it. Such learning is harmonised with the protective capabilities as it contributes to adjusting organizational structures and exploring new knowledge within the existing knowledge pool of a firm for innovation purposes (Oktemgil & Greenley, 1997). Additionally, the adaptive learning prompts agents and functions to iteratively alter their behaviors and experiment with new ways of performance: “that firm can have the ability to dynamically alter its structure to solve changing business problems and achieve goals or objectives” (Akgün, et al., 2012, p.181). In opposition to protective capabilities, destructive capabilities result in change as they conquer the existence of a social structure and reconstitute its rules and agents. Such capabilities therefore need a learning capability that does not only devastate the existing social structure but also recreates that structure. As a consequence, the creative learning process with its ability to revolutionarily and entrepreneurially generate new knowledge that results in developing new innovations is an antecedent of recreating social structures. The creative learning assists agents not to exploit existing resources or facilities; instead it assists them to continuously build the routines and processes that are crucial for developing new ideas and product architects, regardless the existing innovation phase (Napier and Nilsson, 2006). Therefore, I argue that the creative learning process of destructive capabilities aids a firm to constantly reconstitute its corporate agents with the intention of renewing its close linkages with technology developers and other industry agents each time it recreates its structure.

2.7 Chapter summary and empirical focus

In this chapter, the researcher has reviewed a broad series of literature within the areas of dynamic capabilities, structuration and innovation for the sake of providing theoretical explanations of how firms' actors inform their actions through specific structural rules and enable them through specific structural facilities while utilizing dynamic capabilities in developing and extending innovation projects. However, only two specific insights will be transferred to the empirical domain of this research in **Chapters Four** and **Five**. The first is represented in explaining the links between the critical incidents that occurred during the life of the innovation project under investigation in this research and the processes of dynamic capabilities from a structuration perspective. The second is represented in explaining by which type of innovative dynamic capabilities (destructive or protective) that innovation project was driven. The reason behind concentrating the empirical domain of this research on these two theoretical aspects is that the first aspect represents the first research question through illustrating what individual impacts each process of dynamic capabilities have on the critical incidents of the project under investigation and the second aspect represents the second research question as it identifies the type of innovative dynamic capabilities used by the actors engaged in the project under investigation through understanding the change or continuity brought to the existing innovation, social structure and corporate agents related to the project.

Chapter Three: Methodology

3.1 Preface

The aim of this chapter is to present the way in which the current research was conducted from a methodological perspective. It begins with a discussion that illustrates the justifications that I relied on for selecting the critical realist philosophical assumption. An illustration of the research approach adopted in the present research is presented in the following section. The chapter goes on to explain the structuration process methodology of the present research in details. This is followed by an illustration of the research strategy adopted in the present research and an illustration of the rationale behind that adoption. The chapter then explains the way in which data were generated and analysed. The chapter concludes with an explanation of methodological issues associated with the case under investigation in the current research.

3.2 Process ontological position

Social research is not isolated from the issues of social ontology. These ontological issues are seen as, “ones to do with whether the social world is regarded as something external to social actors or as something that people are in the process of fashioning” (Bryman, 2008. p.4). Two conflicting ontological positions usually exist within the social sciences: objective and subjective positions. The former emphasises that “there is only one truth, an objective reality that exists independent from human perception” (Sale & Barazil, 2006, p.57). This implies that society is material and objective and is defined by its systematic character (Hassard, 1991). These assumptions are however rejected by the subjective ontological position, which believes that social reality “does not possess an

external concrete form. Instead it is the product of inter-subjective experience” (Hassard, 1999, p.277). This position requires researchers “to deconstruct the phenomenological processes through which shared realities are created, sustained and changed” (ibid).

As I am considering the role of firms’ social structures and actors in enabling and constraining the process of innovation development/extension through the reliance on dynamic capabilities, I chose the ontological position process to understand the use of these dynamic capabilities in the innovation development/extension processes. The selection of the ontology process, which comprises objective and subjective elements, is justified by its focus on both “how the qualities of an entity (e.g., an individual, group, organization, institution) change over time and how processes themselves emerge, develop, grow, and decline over time” (Langley, et al., 2013, p. 6). This implies that the ontology process can shed light on the change/continuity occurring to the objective elements under consideration in this research, namely, the actors themselves who mainly engage in the process of innovation development/extension and the material resources created, reconfigured, leveraged, coordinated, integrated and energized for that process. The ontology process also concerns the subjective elements subject to change/continuity of the current research, such as the process of innovation development/extension itself and the actors’ understanding of their individual roles while using dynamic capabilities in developing/extending innovation projects. Moreover, the subjectivism aspect of the ontology process assumes that the existence of social reality hinges on the subjective interpretations of actors (Lindgren & Packendorff, 2009). This means that the social reality is not separated from the actors who perceive it; it in fact exists in their minds and is developed by the recursive interaction between them. Therefore, I argue that innovative

dynamic capabilities can be subjectively interpreted, developed and maintained in social communication and interaction between actors.

3.3 Critical realist epistemological position

Management researchers should understand the philosophical obligations they have by choosing appropriate research strategies, as this enables them to comprehend the phenomena under investigation (Johnson & Clark, 2006). Bryman (2008, p. 13) emphasised that “an epistemological issue concerns the question of what is regarded as acceptable knowledge in a discipline”. In this regard, two conflicting epistemological philosophies are usually compared: positivism and interpretivism. In this comparison, it is imperative not to fall into the trap of preferring one philosophical assumption at the expense of another. However, “as always, which is better depends on the research question(s) you are seeking to answer” (Saunders et al., 2009, p. 109). Positivism prompts generalising the end product of the research and considers it as a rule owing to the inclination to apply methods from the natural sciences to the social sciences including management (Remenyi et al., 1998). In contrast, interpretivism rejects the notion of applying the methods of natural and the physical sciences to the social sciences and argues that businesses and individuals such as employees and consumers are complicated enough that they cannot be easily theorised upon by decisive laws, which is the case in positivism (Saunders et al., 2009). Despite the dominance of positivism and interpretivism, other epistemological philosophies should be taken into consideration. Contextualism, which holds that any action should be only understood according to a specific context (Price, 2008), is one example of these philosophies. The pragmatism, which emphasises that thought, is not representative of reality, but of the interaction

between people and their society (James, 1909) is another example. The critical realism, which combines the claim that each social structure/system is influenced by casual powers with the claim that the change in social structures/systems is driven by social casual mechanisms (Collier, 1994) is also an example.

The researcher's philosophical position should be primarily determined by the objectives that a study seeks to fulfil. Taking into account the aim of this project, which is to investigate structurally and track the use of innovative dynamic capabilities in developing or extending automotive innovation projects, this research adopts the philosophical stance of critical realism. Additionally, the nature of the interactive rapport between the investigator and the individuals who were interviewed for the purpose of attaining this research aim, made it preferable to consider the study within a critical realist context. In critical realism, "the concept of 'mechanism' (in the social sciences, 'process' is the usual term) is central to explanation, and these mechanisms and processes are seen as real phenomena, rather than simply as abstract models" (Maxwell, 2012, p.9). The adoption of this particular philosophical position is explainable and its various justifications are detailed below.

This research investigates the use of innovative dynamic capabilities while developing/extending automotive innovations, based on the theory of structuration process. I rely on the critical realist epistemological position to perceive social reality as a constructed society that is characterised by the persistent interaction and communication of its actors. This can take the form of social interaction where different meanings of a specific process are changed or sustained by the mutual interaction between individuals from different positions within a specific social structure. This form is consistent with the

view of critical realism, which sees reality as an outcome of multi-strata interaction (Bhaskar 1975, Benton & Craib 2001). It can also take the form of self-interaction where new meanings of that process stem from reflective processes within each actor (Blumer, 1969). This perception of social multi-strata interaction and self-interaction defines the foundation of my involvement in this research. In fact, it leads me to assume that as the emergence, change or continuity of different and new meanings of a specific process are driven by the multi-strata and self-interaction of actors engaged in that process, the actors who rely on dynamic capabilities to be involved in the development/extension of innovation projects possess distinct individual and collective experiences. These experiences are informative enough to explain how actors perceive their social structure and understand their capability to create or resist change. They are informative enough due to the fact that unlike other epistemological stances, the stance of critical realist holds that “causality” is an integral part of reality, it is central to our understanding of it. This means that critical realism can allow me to reason and explain the actors’ actions and interactions with their social structure while using dynamic capabilities in developing/extending innovation projects. Critical realism is characterised by its ability to offer context-deep theoretical explanations (hÓbáin, 2012).

From my position as an investigator and also as a participant in this research, I could see that critical realism’s assertion on social interaction may be self-applicable. Given the various social interactions and communications that I managed to engage in, and the self-reflections that emerged from such interactions and communications, I could obviously detect linkages between the theoretical insights into innovative dynamic capabilities explained in this research and the data generated as a result of my social interaction with

the participants and personal reflections. Critical realism does not prevent researchers from using their own prior knowledge to perceive appropriately the phenomena being investigated. In addition, dynamic capabilities are often defined as operating routines that enable organisations to accomplish new resource configurations (Eisenhardt & Martin, 2000; Zollo & Winter, 2002; Zahra et al., 2006). Considering the way in which firms routinely develop and use dynamic capabilities made it preferable to adopt a critical realist assumption in this study as it encouraged interactive communication with the participants during the data generation process. Therefore, the complex dimension of the use of innovative dynamic capabilities can be accurately perceived. As Leach and Sabatier (2005, p. 499) argue, “in fields where theory is relatively imprecise or phenomena are especially complex or studies are difficult to devise, strong inference remains laudable”. However, as critical realism entails an overlap between the participant and the researcher, the latter should be fully aware of the hazard of allowing his pre-existing knowledge to control the process of generating empirical data (Brannick & Coghlan 2007). Another reason for adopting a critical realist approach in investigating dynamic capabilities is its association with structuration perspective. Structuration studies and critical realism fit well together (Pettigrew, 1997a & 1997b).

The tendency of this doctoral research was to adopt one epistemological position and stick to it rather than merging two philosophical paradigms and facilitating the dialogue between them, which is fundamentally grounded on Bryman’s (2008) argument that relies on the conviction that mixing philosophical positions results in dissonant epistemological principles.

The above discussion evidently justifies the rationale behind relying on a single philosophical paradigm in this research and illustrates how the interactional exchange between the researcher and participants could aid in grasping the essence of dynamic capabilities use and the way in which dynamic capabilities are socially used.

3.4 Abductive research approach

The aim of this section is to examine the appropriateness of the common research approaches in relation to the questions and epistemological position of the current study. In research practice, it is common to discriminate between deduction and induction. The deductive approach constitutes a theoretical framework, whereby a hypothesis is deduced that is operationally expressed and tested before examining its outcomes (Robson, 2002). In opposition to the deductive approach, the inductive approach is an attempt to understand closely a research context by observing empirical events and building on these empirical observations to obtain insights into the meanings people attach to such events (Saunders et al., 2009). However, limiting the methodological choices in this regard to deduction and induction approaches only represents imperfect understanding of the tools used to develop and refine social theories, as there are other tools that can be used for an identical purpose. The abduction approach, for instance, is considered to be a pivotal mode of logical reasoning alongside deduction and induction (Kapitan, 1992) owing to its ability to widen knowledge and catalyse the research process (Habermas, 1978).

The current research addresses the concept of dynamic capabilities, which, according to Helfat, et al. (2007), demands further empirical development. Pablo et al. (2007, p. 690) asserted that, “while the dynamic capabilities framework is drawing support and

increased validity by researchers, empirical studies of dynamic capabilities remain relatively rare". The lack of empirical studies on the perspective of dynamic capabilities suggests that the use of an abductive approach would be necessary given the fact that this research heavily relies on theory (dynamic capabilities perspective, structuration theory and innovation-based theories) to explore the theoretical domain of dynamic capabilities, as well as its empirical domain. In addition, the nature of this research and the necessity to examine closely the use of dynamic capabilities also encouraged the adoption of the abductive approach as it clearly explains how a specific agency works, which is what this research aims to understand through a social explanation of the use of innovative dynamic capabilities as an agency. It does not prove that this agency must work in a certain way which other research approaches do such as deduction (McEvoy & Richards, 2002). Most importantly, abduction can be utilised to shape connections that facilitate the perception of specific relations that are vague or not adequately obvious. Examples of these relations in this research are those between the actors of the case study and their external and internal structures while engaging in the development of the respective innovation project. They can also take the form of the relationships between the processes of dynamic capabilities and the properties of structuration theory. Understanding such vague relations supports my novel view of dynamic capabilities and their use from a structuration perspective as it encourages the formulation of new notions, placing an existing theory/perspective in a new context and seeing it from a different perspective (Danermark et al., 1997).

In contrast, the deductive approach, which suggests the deduction of theory-based hypotheses, does not accommodate the concept of dynamic capabilities, as it is too

complex to form a hypothesis beforehand. Furthermore, the application of the inductive approach can only be possible in this research if I was allowed to observe closely and directly the critical incidents related to the innovation project under study within the context in which it was planned and developed and afterwards induce a set of explanations associated with the use of dynamic capabilities in such a project. The application of the inductive approach means that I am required to be an integral part not only of the research process but also the development of the innovation project under study through direct observation (Saunders et al., 2009), which is something I could not attain.

Moreover, after an extensive exploration of the methodological approaches of previous research in the domain of dynamic capabilities and other technological capabilities, it is evident that researchers tend to adopt the deductive approach while conducting their studies on dynamic capabilities. However, some advocate the use of the inductive approach. For instance, Figueiredo (2003) adopted an inductive approach to examine how the intra-firm learning processes result in different technological capabilities among firms in the Brazilian steel industry. Similarly, Roy and Roy (2004), in their study of the merger of HP and Compaq from a dynamic capabilities perspective, employed an inductive research approach. More recently, Athreye (2005) also applied an inductive approach to investigate the development of service capabilities in the Indian software industry. On account of the prevalence of deductive and inductive approaches in the empirical domain of dynamic capabilities, I was stimulated to empirically carry out the current investigation from a different research approach in an attempt to understand them differently. The choice of abduction is relevant in this context.

3.5 Structuration process approach of innovative dynamic capabilities

It is widely recognized that concepts that are likely to be open to variant explications are a key challenge for academics and researchers who seek to investigate them. The dynamic capabilities perspective is still mysterious enough to be open to different interpretations and perceptions. As explained earlier, there is a theoretical consensus that dynamic capabilities are firmly planted within the boundaries of firms as organizational or operating routines (Eisenhardt & Martin, 2000; Zollo & Winter, 2002; Zahra et al., 2006). This implies that these routines have been chronologically developed and are predicted to develop over time. With the aim to comprehend how the innovative dynamic capabilities are sequentially developed and used, I decided to rely on a structuration process approach in researching them.

Scholars distinguish between two different approaches of investigating a process; the variance approach and the process approach (Mohr, 1982; Poole, Van de Ven, Dooley & Holmes, 2000; Sminia, 2009; Van de Ven, 1992; Van de Ven & Poole, 1995, 2005). The variance approach is the approach “in which ‘process’ is considered to be the logic by which independent variables are taken to be contributing factors to a certain outcome” (Sminia, 2009, p. 99). Contrary to this, the fundamental bedrock of the process approach is that a process is a sequence of incidents (Giddens, 1979; Sztompka, 1991; Pettigrew, 1990; Van de Ven, 1992; Sminia, 2009). The process approach is characterised by its complexity in comparison with the variant process. This complexity is embodied in the necessity of tying between a series of events, a series of time scales and the movable nature of the actions that shape each event (Van de Ven & Poole, 2005). The process approach should, therefore, explain the mechanism in which each event results in and has

an impact on the sequence of events and demonstrates the mechanism in which all the observed events refer to the overall pattern (ibid.). Further explanations on the differences and intersections between the variance and process approaches are presented in Appendix 1.

3.5.1 Contextualist process approach

The process approach has an ingrained dilemma in relation to the debate of generalist versus contextualist. This dilemma has been recently reviewed and discussed from an organizational and strategic perspective by Sminia (2009) as he distinguished between the extreme contextualist end and the extreme generalist end of the continuum. He illustrated that “at the extreme contextualist end, everything is in flux, and there is nothing against which any truth claim can be grounded, because there would already have been change as things had moved on” (Sminia, 2009, p. 113). Within the process research literature, examples of the contextualist route can be found in a number of Pettigrew’s strategy formation studies, such as Pettigrew and Whipp (1991), Pettigrew et al. (1992), and Pettigrew and Fenton (2000). In contrast, “at the extreme generalist end, process is simply seen as conforming to fixed flows and sequences that regulate how one event is followed by the next and automatically leads to a pre-programmed outcome” (Sminia, 2009, p. 113). This implies that statistical generalisation can be attained through pursuing a positivist type of research (ibid.). Examples of the generalist route can be found in some studies of Van de Ven and Mintzberg in the literature of strategy formation processes. In the present research, I was more biased toward the contextualist part of the continuum owing to two focal considerations. This position is firstly justified by the fact that the critical realist epistemological philosophy of this research is more consistent with the

contextualist route, as it criminalises the statistical generalisation that derives as a consequence of adopting the generalist route. Numagami (1998) found that the statistical generalisation is not a feasible exercise with research that takes a contextualist route. Secondly, as I see dynamic capabilities from a structuration perspective as **an agency in which actors draw on their perception of the external structure of their firm and their own knowledge of their roles (internal structure) to create, reconfigure, leverage, coordinate, integrate and energize the resource base of their organization with the objective of initiating or adapting to change**, this implies that the resource base of the case under investigation is not only subject to extension but also modification or creation from scratch, especially if the product innovation under development is radically new, so that the existing set of capabilities may become a liability for developing the new product innovation. This possibility means that each activity of those activities that contribute to shaping the events in the case that I am investigating is likely to be “unique, and one cannot expect that similar processes will occur at any other space or time” (Sminia, 2009, p. 113). This is even more attainable in the automotive industry where firms heavily concentrate their business on developable science and technology and the number of merger and acquisition and partnering activities is high.

The pursuit of contextualist route did not just avoid me obtaining “pre-programmed outcomes”; it also assisted me to explain the turning points of the observed sequent events and their casual factors (Van de Ven & Poole, 2005). The contextualist route also complies with the two yardsticks that have been identified by the process researchers as critical stipulation that should be considered while choosing the method of the research process. First, as the contextualist route discriminates each event process and describes its

distinct historical narrative, it could enable me to achieve what Poole et al. (2000) urged researchers to take into account while conducting a process research which is the necessity of identifying the temporal links between single events and the whole pattern. Second, given its highly focused orientation, it assisted me to appropriately track the time scale of each event by taking into consideration the fact that each event can be characterised by its distinguished time frame, some of them last for years and others remain for shorter periods (Langley, 1999). Above all, contextualists hold that in a structuration process, agents usually rely on the “scripts” of their structure (inner context) to create change (Pettigrew, 1985). This is an element I emphasize in the framework to explain dynamic capabilities from a structuration perspective (Figure 3 in **Chapter Two**). The compatibility between the contextualist route and the structural framework of dynamic capabilities adopted in this research can be further explained. According to this framework, the activities associated with the learning, reconfiguring, leveraging, coordinating, integrating and energizing processes of dynamic capabilities are influenced by at least one structural impact factor (signification, domination and legitimation). Such influence is not fixed or predetermined as the generalist route may assume; instead it regulates these activities immediately prior to their occurrence commensurate with the existing status of the respective critical incident of the process of structuration at that specific time.

3.5.2 Validity and reliability of the process approach

It is understood that the subjectivity in process research is an ingrained dilemma that process researchers are keen to eliminate. It is much associated with our conventional interest in validity and reliability (Cook & Campbell, 1979). Process researchers are

occasionally compelled to propose signals for events they cannot explain or observe (Pentland, 1999). This “unobservability” of structures, events and actions is a core drawback of structuralist thinking (Rimmon-Kenan, 1983). This is particularly attributable to the fact that “we are limited to surface observations, yet our explanations require that we identify the underlying structure” (Pentland, 1999, p. 719). Unfortunately, with surface investigations, researchers would only be able to describe events but not explain them and justify their sequential order. Therefore, the dilemma of explaining the generative mechanisms that drive the single events and thereby the whole process will still surface. Such dilemma urged Pentland (1999) and Van de Ven and Poole (1995) to call for consideration of three further structural levels alongside the surface level while investigating a process. These levels are represented in “generating mechanisms”, “fabula” and “story” respectively. The generating mechanisms level represents the deepest level of structural levels and comprises a description of an abstract process through the reliance on “generative grammar” or “generative mechanisms” (Pentland, 1995). This level does not provide answers for the why and how questions, as it is more associated with the mechanism in which particular events are narrated rather than the mechanism in which these events are explained (Pentland, 1999). In other words, this level provides us as researchers with the overall underlying indicators of the social structure of the case under investigation. It is the level where I can comprehend the constraints and enablers of the social structure of the case under investigation and its innovations from a broader view (e.g., the overall view of product development department). The fabula level is the subsequent structural level and it refers to “a specific set of events, actors, and their relationships (e.g., who does what, in what sequence, and

so on) (Pentland, 1999, p. 720). The fabula level sheds light on the fundamental events and determines which traits are used to distinctly identify each event (ibid.). This level details the mechanism in which a particular event occurred. It is the level where I can induce explanations for the development of a specific innovation and the rules and facilities accompanied with its development. The third level is the story level and it is concerned with explaining multiple points of view on specific events within a fabula (Bal, 1985). The importance of this level is magnified when it comes to the structuration process, as it reflects diverse points of view that pertain to different actors participating in the process under structuration. In the present research, I reckoned on this level to chronologically comprehend the transitions in the social structure of the case under investigation and explain the process of developing new innovations from the perspective of old and new actors. Structurally explaining the use of innovative dynamic capabilities in the case under investigation and the associated transitional events from the perspective of the three levels demonstrated above, alongside the surface level and my own narrative voice is a mechanism for enhancing the degree of objectivity of each event under observation (Pentland, 1999).

Looking at the structure and events of the case under consideration from multiple structural layers was not the sole mechanism for enhancing the validity of the finding of the present research. Another mechanism for enriching both the validity and reliability of this research's findings was represented by attaining a degree of consistency between my own understanding of the events being observed and the practitioners' understanding of the same events. Van de Ven and Poole (1990, p. 321) emphasised that if inconsistency is found between the two perceptions, "no claims about the meaning of events to the

participants are valid". To avoid such dilemma, I followed the same technique used by Van de Ven and Poole (1990) when they were investigating the process of innovation development in the Minnesota Innovation Research Program, which allows the key participants to scrutinise and review the resulting list of events. Such technique is seen as a corrective opportunity and most importantly an attempt to reconcile between the "theoretical perspective" and the "social reality" while explaining events.

3.6 Case study research strategy

According to Easterby-Smith, et al. (2012), management research concentrates primarily on the management actions undertaken and their effect on the business, viewed from a critical perspective. In order to investigate the different research strategies available and their application to management research, the brief now examines the theory of research to identify different approaches and their definitions. This starts with a brief review of research principles before moving on to examine management research methods.

In practical terms, management research often uses methodologies based on case studies, surveys, experiments, action research and, to a lesser extent, grounded theory. Grounded theory is less often used in management research since it relies on the selection of study elements based on a purely theoretical basis. While this is common in medical research, it is often very difficult to achieve for management researchers who can rarely select such a group and cannot replicate 'laboratory' conditions.

Case studies can be used to analyse two very different scenarios. The first is the examination of the rare or unique phenomenon (Piekkari & Welch, 2011), and the second is the analysis of the commonplace. The first case seeks to draw differences in the way

one organization has acted compared to other players in its market. This can be used to identify features that led to unusual success or failure. The second case can be used to draw out features common to many or most of the players in a market to identify how these features contribute to success or failure. In the first case, only a single study is performed and in the latter, several are carried out. The benefits of case studies include the fact that the analysis is based on real-world data, they can identify important qualitative features and they allow in-depth analysis. Disadvantages include a potential for lack of objectivity, the effort required, the potential to read too much into a specific case study and the lack of statistical validity (Mustafa, 2008).

Surveys can be useful to determine views of populations, or sub-sections of a population. In the modern environment, the Internet adds a powerful channel for conducting surveys to the traditional method of one-to-one interviews (Sappleton, 2013). The benefits of surveys include the ability to tailor the survey questions to the research needs, it is possible to target surveys at specific groups using pre-existing databases or web forums, and in the case of internet surveys, the possibility of providing rapid results from a large sample pool. Disadvantages include time to construct the survey questions, potential bias in the formulation of questions and in general, the paucity of qualitative data (Tomlinson & Arnold, 2008).

Experimental research is appropriate for determining causal relationships. This method uses a laboratory-condition type approach, in which subjects are exposed to a pre-determined scenario and data is gathered during the experiment. This type of analysis provides the strongest paradigm for determining such causal relationships, but it also limits the range of evidence that can be collected. Additionally, given the resources

involved in setting up the experiment, there is a risk that the data collected may be limited in usefulness (Daniel & Sam, 2010).

Action research is widely used in business. This is where research ‘themes’ are examined using reflective analysis of real-world scenarios (Checkland & Holwell, 2007). This can be carried out during organizational changes, where changes are implemented and analysed during the process. This allows lessons to be learned during the process and also can help to fine-tune the changes being implemented.

As the present research investigates a single entity located within the scope of the UK automotive industry, it can be contended that the adoption of a single case study research strategy was a feasible mechanism for answering the research questions and attaining its objectives. This is consistent with what Hartley (2004) believes, as he stressed that case study research is a strategy that evidently fits with the investigation of a given social process that emerges in a specific context. In general, within the scope of empirical studies conducted in the field of strategic management, including dynamic capabilities and resource-based studies, the tendency of researchers to favour quantitative research strategies at the expense of case study research strategy or other research qualitative research strategies is obvious (Ambrosini & Bowman, 2009). However, such studies of dynamic capabilities were just able to broadly describe dynamic capabilities and failed to delve into the “detailed, micro-mechanisms of how these capabilities are deployed or how they work” (Ambrosini & Bowman, 2009, p. 37). This explains why Danneels (2002) and Bruni and Verona (2009) agreed “to sacrifice some of the generality of quantitative investigation for a more qualitative attention to detail” (Lockett & Thompson 2001, p. 743) while they investigated the role of dynamic capabilities in developing

product innovations within the physical business-to-business products industry and pharmaceutical industry, respectively. Another rationale for conducting studies that empirically investigate dynamic capabilities based on a case study research strategy rather than any quantitative research strategy lies in the difficulty of compiling “longitudinal data” through the reliance on the survey instrument (Danneels, 2007). This inability of quantitative research strategies, including the survey instrument, to collect longitudinal data collides with the essence of the present research as it substantially seeks to observe, identify and explain the transitions that are influenced by the use of innovative dynamic capabilities and result in the continuity or the change in the duality between the social structure and action of the case under analysis. The choice of the case study research strategy was also justified by the fact that case studies are more suited to provide answers to the why and how questions due to their capacity to comprehend the context of the process under consideration (Bryman, 2001). This is extremely vital for the present research as generating answers to the why and how questions paved the way for me to explain the events being identified and comprehend the mechanism and rationale behind their occurrence. This is how I was able to eliminate the intangibility of dynamic capabilities; otherwise, they would still be “abstract and intractable” (Danneels, 2008, p. 536).

Following the distinction made by Stake (2008), I can differentiate between two types of case study. The “intrinsic” type represents the case study that prompts researchers to grasp and perceive the specific singularity of a single case. In contrast, the “incremental” case study type comprises multiple cases that are under examination in order to generate insight into a phenomenon. In the current research, I advocated the adoption of the former

type. My choice to conduct a semi-longitudinal single case study was justified by two fundamental drives. First, narrowing the scope of the present research and limiting it to one unit of analysis implies that I could be in a better position to conduct a more in-depth investigation that allows me to perceive the way in which specific automotive product innovations are developed and evolved over time and detect the motives that either slow down or accelerate the pace of this development. Second, “conducting process studies is very labour-intensive and typically involves the collection of large amounts of multifaceted data” (Van de Ven & Poole, 2005, p. 1385) and given the hazard of “data asphyxiation”, as Pettigrew (1990) argued, process researchers are warned to not collect data from multiple structural levels. Thus, a single case study was obviously the preferable research strategy option for the present research, taking into consideration the limited time frame available to the researcher to finalize the research. Further and elaborate details of the case under study are presented in the section specified for the development of the case study in this chapter.

3.7 Data generation methods

Prior to delving into the specific details of data generation (collection) methods, I will start this section with a broad preface through examining primary and secondary data and their role in management research. Primary data is new data that has not been collected before. Two main methods of acquiring this type of data are observational and questioning (Moore, et al., 2005). The observational approach can help avoid potential bias due to direct contact between researcher and respondent, and it can be achieved in many ways such as the use of two-way mirrors, cameras or recording equipment. This allows the respondent to behave in a normal manner, unconstrained by obtrusive

observation. Other methods include examining the behaviour and promotion of competitors for example at a trade show or exhibition, or watching participants negotiating a new website design, for example. Questioning methods involve direct contact between interviewer and respondent. This can introduce some bias and potentially some reticence on the part of the respondent. On the other hand, this approach can provide a richer set of data because the respondent's views can be probed directly, and the interviewer can react to the responses given in order to discuss particular features in more depth or using cross-referential methods of questioning. Both types of enquiry can provide quantitative and qualitative data, and the type of data required should influence the design of the activity.

The observational approach allows the respondent freedom to behave in a natural manner, which may highlight unexpected behaviour. Respondents may approach tasks in a way not anticipated by the researcher, for example, when opening a packet, respondents may ignore the printed instructions on the pack and may instead adopt a different method such as using their teeth to assist in the opening. This could highlight problems with the design of the packet. On the other hand, the questioning technique is more structured, and most often is carried out with the help of a pre-prepared questionnaire. The design of the questionnaire is of vital importance. It must solicit the wanted information from a variety of respondents, sometimes in a time-constrained manner. According to Moore et al. (2005), the order of questions can be important in this regard, with more sensitive questions left to the latter part of the interview. Each question must be clear and unambiguous to respondents so that they can answer the question without the possibility of them misunderstanding the requirements.

Another method of soliciting data is through interviews, which may be structured, semi-structured or unstructured. A structured interview shares many commonalities with a questionnaire and has many of the same benefits and drawbacks in that the data solicited is constrained to ensure its relevance, but on the other hand it may ignore potential issues not addressed during the interview. A semi-structured approach may offer many of the advantages of the structured approach but with the additional scope to probe interesting answers in more depth. This runs the risk of derailing the interview from the initial schedule but may provide richer data than the structured approach. Unstructured interviews exacerbate these risks but with additional possibility of uncovering rich data covering unanticipated findings (Hackley, 2003). Rowley et al. (2010) identified a method of overcoming some of the problems with semi-structured interviews by using a card-based system to help respondents order their thoughts using the structuring of pre-prepared cards. This had the benefit of reducing the interviewer-respondent interaction because the interviewee focused more on the cards than on the interviewer. This highlights that there are methods of organising data collection activities to emphasise their benefits while reducing their drawbacks. These methods can be used on a one-to-one basis and with small groups such as focus groups. For larger groups, the questionnaire-based approach becomes more appropriate than the time consuming observational based methods; the approach taken is largely driven by the research objectives, the number of participants and the resources available to perform the activity (Greenbaum, 1998).

The advantages of primary data are that, when acquired as part of an effective research activity, they can provide highly tailored data with a high degree of relevance to the

particular subject under examination. However, the collection of primary data can be expensive and time consuming. It can also be risky in that the data collected may not be as informative as hoped for. By contrast, secondary data is readily available even though it may not be directly relevant to the research aims (Kazmi, 2007). Secondary data is that data that has already been collected by another researcher, and secondary research is the activity of examining existing research to draw out conclusions about a particular area of study. As well as being readily available, secondary data avoids potential pitfalls relating to privacy and ethicality that are major issues in primary research (Lancaster, 2005). Crowther and Lancaster (2008) point out that although secondary data is rarely sufficient to meet all of the needs of a management research activity, it can help in a number of ways. These include identifying the problem, developing an approach to tackle the issue, answering some of the research questions and helping the interpretation of primary data. In some cases, secondary data may be sufficient to answer research requirements. This will generally be in the case where a researcher (or more) has examined a subject very close to the current requirement, where the subject matter is of general interest (e.g. management techniques and methods) or the existing literature when taken together provides sufficient insight to allow conclusions to be drawn. In what follows, I will respectively discuss the data generation method that I adopted in the present research and the way in which this research's participants were selected.

3.7.1 Interviews

The selection of a specific data generation method is principally hinged on the prior choice of the research strategy, the research objectives and the accessibility of data. Therefore, taking into consideration the qualitative nature of the present research, the

decision of relying on interviews as the primary data generation method was necessary for a number of justifications. Zikmund (2003) stressed that studies that are characterised by their investigative nature should reckon on qualitative interviews to enhance and enrich the researchers' ability to justify the attitudes of their informants. Obviously, as I seek to investigate the dualism between the social structure and the actions of the case under investigation while they were developing automotive product innovations, it was vital to delve into the specific details of that case in order to have a fuller picture of these innovative dynamic capabilities that were used to either maintain or change that dualism. This implies that I was in need to hear the voice of the people or "actors" who created and recreated those actions and I was also in need to be acquainted with the influence that such actions have on the development of the automotive product innovation under study. As a consequence, qualitative interviews were utilized to comprehend the motives of the actors' actions. Robson (2002) emphasised that the adoption of interviews as a data generation method does not only enable researchers to deeply reveal the actions of participants, it also enables them to identify the routines of those participants and the response of their surrounding environment to their actions. This could assist me to firstly track and explain the actors' actions prior to, during and after the development of the automotive product innovation under study and secondly keep an eye on the degree of change that might occur to the social structure of the case under consideration.

Two types of qualitative interviews were adopted in the current research: formal in-depth semi-structured interviews and informal unstructured interviews. First, semi-structured, face-to-face interviews were utilized to grant me the opportunity to proactively formulate the interview questions and the flexibility to formulate pivotal questions that might be

deduced from the participant's answers. This is extremely critical for the present research, as I was an outsider to the case under investigation and thereby my perception of the development process of the product innovation under investigation and the role of innovative dynamic capabilities in that process was likely to be imperfect. Those who internally participate in the development of such automotive innovations do not just generate answers; they could also open areas for new questions. The selection of formal semi-structured interviews is also associated with the way I selected to enhance the validity and reliability of the present research. As I previously decided to go through different structural levels (surface, story, fabula and generating mechanisms) and generate data from all these levels, it was imperative for me to adjust the pre-formulated interview questions to be compatible with different participants on different structural levels. Second, the purpose of using informal unstructured interviews lies in that such interviews enable me to discuss and review the outcomes of the core formal semi-structured interviews with the participants, prior to commencing the analysis process of their answers. This as I stated earlier, is an opportunity for correction, addition and avoiding any misunderstanding that might occur. These interviews were informal in nature and were conducted by telephone. In addition to the two types of qualitative interviews, secondary data were used to feed and support the primary data. These data take the form of annual reports and documentations of the firm under analysis, internal magazines and industry reports. A circular frame (Figure 1 below) summarises the three data generation methods of the present research.

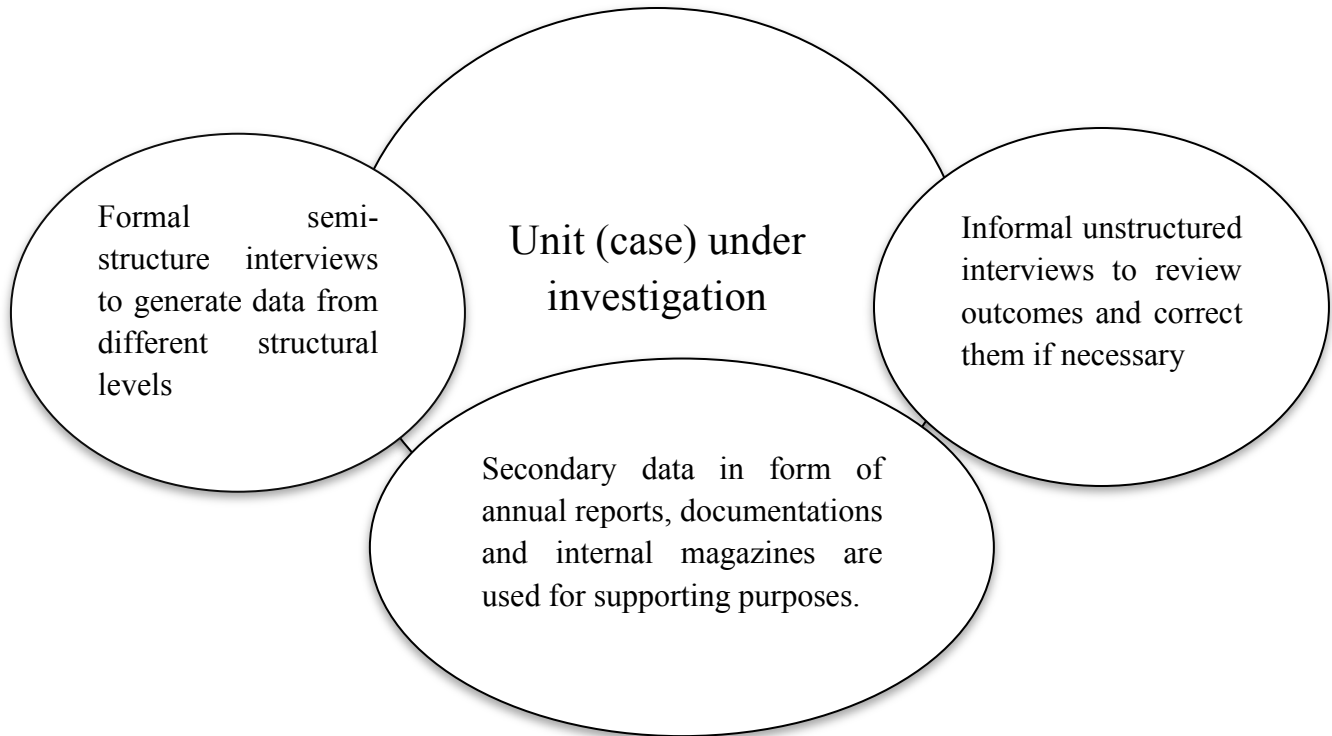


Figure 1: Summarization of data generation methods

3.7.2 Selection of participants

As the present research is concerned with the way in which a specific automotive product innovation is evolved over time and the way in which the actors' actions and the external and internal social structures of the case under investigation are consequently maintained or changed, I was therefore only interested in interviewing those who were indeed participating in developing the innovation under study to tell me the "actual" narrative behind the development of this innovation and how differently they act and draw on their social structure each time a new product innovation is developed. This tendency is consistent with the advice given by Blumer (1969, p. 41) who prompted researchers to rely on "participants in the sphere of life who are acute observers and well informed". I accordingly followed the path in which Bruni and Verona (2009) selected their

informants to investigate the innovative dynamic capabilities in the pharmaceutical industry. Due to “the ‘visibility’ of the object of inquiry with respect to the theme of dynamic capabilities” (p. 104), they concentrated on actors who really engaged in the process of product innovation. This implies that my focus should be directed towards interviewing those actors who hold specific product-innovation-based positions, such as product development engineers and managers, R&D managers, business model engineers and other comparable positions, the people whose previous and current engagements in the product innovation process are evident.

Additionally, as I decided to generate data from multiple structural levels, I was in need to interview multiple actors involved in the same action. Therefore, it was critical for me to adopt the technique of snowball sampling (Heckathorn, 1997) in an attempt to reach further participants who represent different levels and who are relevant to the process I was investigating. This technique was conducted by issuing an informal request to the participant I initially spoke with in order to connect me with other participants engaged in the process I was investigating. This technique was obviously feasible, taking into consideration the fact that I was investigating a single case. This technique to some extent maximised the number of interviews conducted and thereby helped me meet the number of interviews usually required for conducting longitudinal empirical studies of dynamic capabilities. Further details on the interviews and informants such as places, dates, and positions are elaborated in the section of case development in this chapter.

3.8 Narrative analysis of generated data

Linguistically, the word narrative is essentially defined as “a spoken or written account of connected events” (the Concise Oxford English Dictionary). From an organizational

perspective, Czarniawska (1998) stressed that the best way to explain the mode of the knowledge and communication in organizations is through narratives. She added that narratives document and codify the construction and reconstruction of organizations and explicate their contents (ibid.). From this explanatory preface, it is apparent that narratives robustly take into consideration the three elements that form the essence of the structuration process, which are events, social structures and actions, as they keep an eye on the sequence of events under observation, document the mechanism in which the relative social structures are constructed and reconstructed and interpret the contents of these structures and thereby explain the way in which people act within these structures. Pentland (1999, p. 712) is convinced that “process explanations that draw on narrative data are particularly close to the phenomena they purport to explain”. This is attributable to the fact that informants do not just explain their world through their narratives, they also proactively plan and initiative stories that are associated with their expectation and potential enactment (ibid.).

3.8.1 Coding

The data generated during the interviews revealed some incidents that are considered turning points in the life of the case under investigation. However, these data remained raw until they were coded in a way that enabled me to extract answers to the research questions and attain its objectives. By following the suggestion of Sminia (2014), four different coding categories were utilized. This allowed me to leave this research’s empirical domain, the observed incidents. It allowed me to penetrate its actual domain, the domain that enabled me to convert the observed incidents into events and set up a comprehensive process account binding the separate unique events. These four coding

categories are: (i) casual coding; (ii) contextual coding; (iii) relational coding; and (iv) process motor coding. They facilitate the detection of the causality in the observed incidents based on the identification and illustration of four different causes: (i) material cause; (ii) formal cause; (iii) efficient cause; and (iv) final cause. Siminia (2014, pp.3-4) defined these causes respectively as, “the ingredients that need to be in place for the activities that make up the incident to happen, the way in which the activities that makes up an incident have been enacted, the fact that the activities that make up the incident actually have taken place and the motivations and purposes for which the activities that make up the incident have been enacted”. The way in which these four coding categories were employed is explained in Table 1.

Casual coding			
Material cause	Formal cause	Efficient cause	Final cause
“What ingredients need to be in place for the incident to happen?”	“What different ways are there for the incident to happen? Which one of them happened?”	“What activities make up the incident? Who is involved? What type of incident?”	“What reason/motivation is there for the incident to occur?”
Contextual Coding			
Time		Place	
“When did the incident take place?”		“Where did the incident take place?”	
Relational cause			
Material cause	Formal cause	Efficient cause	Final cause
“Has an outcome of an incident affected the	“Has an outcome of an incident affected the way in	“Has an outcome of an incident affected whether	“Has an outcome of an incident affected the reasons why activities

ingredients necessary for the activities that are part of a subsequent incident?" (Input/output relationship) "Has an evaluation of an effect by a participant in an incident affected the ingredients necessary for the activities that are part of a subsequent incident?" (Feedback relationship)	which activities that are part of a subsequent incident have taken place?" (Input/output relationship) "Has an evaluation of an effect by a participant in an incident led to changes in the way in which activities are done the next time such an incident takes place?" (Feedback relationship)	activities that are part of a subsequent incident have taken place?" (Input/output relationship) "Has an evaluation of an effect by a participant in an incident led to different activities being undertaken the next time such an incident takes place?" (Feedback relationship)	that are part of a subsequent incident should take place?" (Input/output relationship) "Has an evaluation of an effect by a participant in an incident led to changes in reasons why activities are done the next time such an incident takes place?" (Feedback relationship)
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Process motor coding

Life cycle motor	Teleological motor	Dialectical motor	Evolutionary motor
"Can incidents be divided up across sequential phases?"	"Do incidents feature as requirement or impediment to reaching a predetermined end state?"	"Do incidents feature contradiction and/or are part of the initiation and settlement of a conflict?"	"Can incidents be associated with moments of variation, selection, and retention?"

Table 1: Process coding
Source: Sminia (2014, p.10-11)

The above coding was used as a framework to code the data generated during interviews prior to narratively analysing them. The entire coding of this research data is presented in Appendix 2.

The coding of the data generated during interviews according to the above framework was then linked the theoretical categories of this research's model (Figure 3 in **Chapter Two**). This was done through coding each critical incident of the case under study in isolation and then identifying the learning, reconfiguring, leveraging, coordinating, integrating and energizing activities stemmed from the coding of each critical incident. This was then followed by exploring these activities from the two aspects of the respective model, which are social structure and agents. The purpose of exploring them in association with the social structure's aspect was to understand how the social interactions, social relationships and roles related to the dynamic capabilities-based activities were affected by the structural rules applied to the process under structuration and to understand how the use of resources while carrying out such activities was empowered/restricted by the signification, domination and legitimation factors. The purpose of exploring them in association with the agents' aspect was to perceive what inform actors' own knowledge of their roles while implementing such dynamic capabilities-based activities.

3.8.2 Narrative properties

After justifying the reliance on narratives to analyse the data of the present research and explaining the multi-categories coding used to convert the raw data that entail critical incidents into unique events, the focus now is turned to elaborating the narrative analysis that I adopted in this research. I relied on the framework developed by (Pentland, 1999) that comprehends the underlying process by analysing it from multiple narrative properties. Narratives can at least generate a description of connected events that pertain to the social structure under observation (Rimmon-Kenan, 1983). However, in fact,

narratives comprise much more than the description of connected events (Pentland, 1999). Scholars such as Bruner (1990), Barthes (1977) and Pentland (1999) underlined that diverse properties can be identified within each narrative. Pentland (1999) emphasised that the narrative analysis of a process should contain the following properties: sequence in time, focal actors, identifiable narrative voice, evaluative frame of reference and other indicators of content and context. The data generated to explain the influence of innovative dynamic capabilities on the development of new automotive product innovations in the firm under investigation was analysed from two of these narrative properties as follows.

The first property, which is **sequence in time**, comprises fragmented but connected narratives that chronologically identify and explain the outset, the middle and the end of a specific process (Pentland, 1999). However, as Van de Ven and Poole (1990) argued, it is better for researches who are interested in investigating the chronological development of a specific innovation process to historically analyse that process prior to its outcomes becoming known. This implies that it should be investigated and then analysed through its entire life without identifying a specific end. This eliminates the probability of biasing the findings of the studies under development (Van de Ven & Poole, 1990). I decided to organize the participants' stories based on their contents' time sequence. The analysis started with the stories that explain the automotive product innovation under investigation at the point of time when it was initiated. The analysis then continued with other stories that chronologically explain the incremental development of that product innovation. Each distinct story was firstly analysed in isolation prior to linking it to the previous and next stories. The analysis of these fragmentary stories maximises the likelihood of

detecting the turning points in the development of that product innovation under the microscope and identifying the accompanying shift in the social structure and the actions of the case under investigation.

The second property of a narrative text, which is labelled as **focal actors**, is used to indicate any type of actor, such as individuals, groups or even organizations. However, the narratives that personify the entire organization as an actor do not aid researchers to investigate the process “from the perspective of the macro-level participants, because whole organizations cannot narrate their experience in the first person (e.g. Digital cannot say, "I was acquired by Compaq")” (Pentland, 1999, p. 714). As the present research is concerned with elements of change and evolution in time sequence, I decided to define the focal actors as those who were actually involved in the development of the new automotive product innovation under investigation during its life. This is methodologically critical due to the fact that each narrative is distinct and its content may vary according to the actor who enacts the events included in the narrative (Pentland, 1999). This orientation is consistent with my tendency to go and generate data from different structural levels. Within each level, I gathered different stories, and within each analysed story, I managed to shed light on individual focal actors and explain how their individual and collective contributions in developing the automotive product innovation under investigation resulted in maintaining or changing their perception of their external social structure and how their own perception, their own knowledge of their roles and their use of their facilities differed over time. This eventually led me to perceive the type of innovative dynamic capabilities the case under investigation has by matching my

analysis findings with my theoretical distinction between protective and destructive innovative dynamic capabilities.

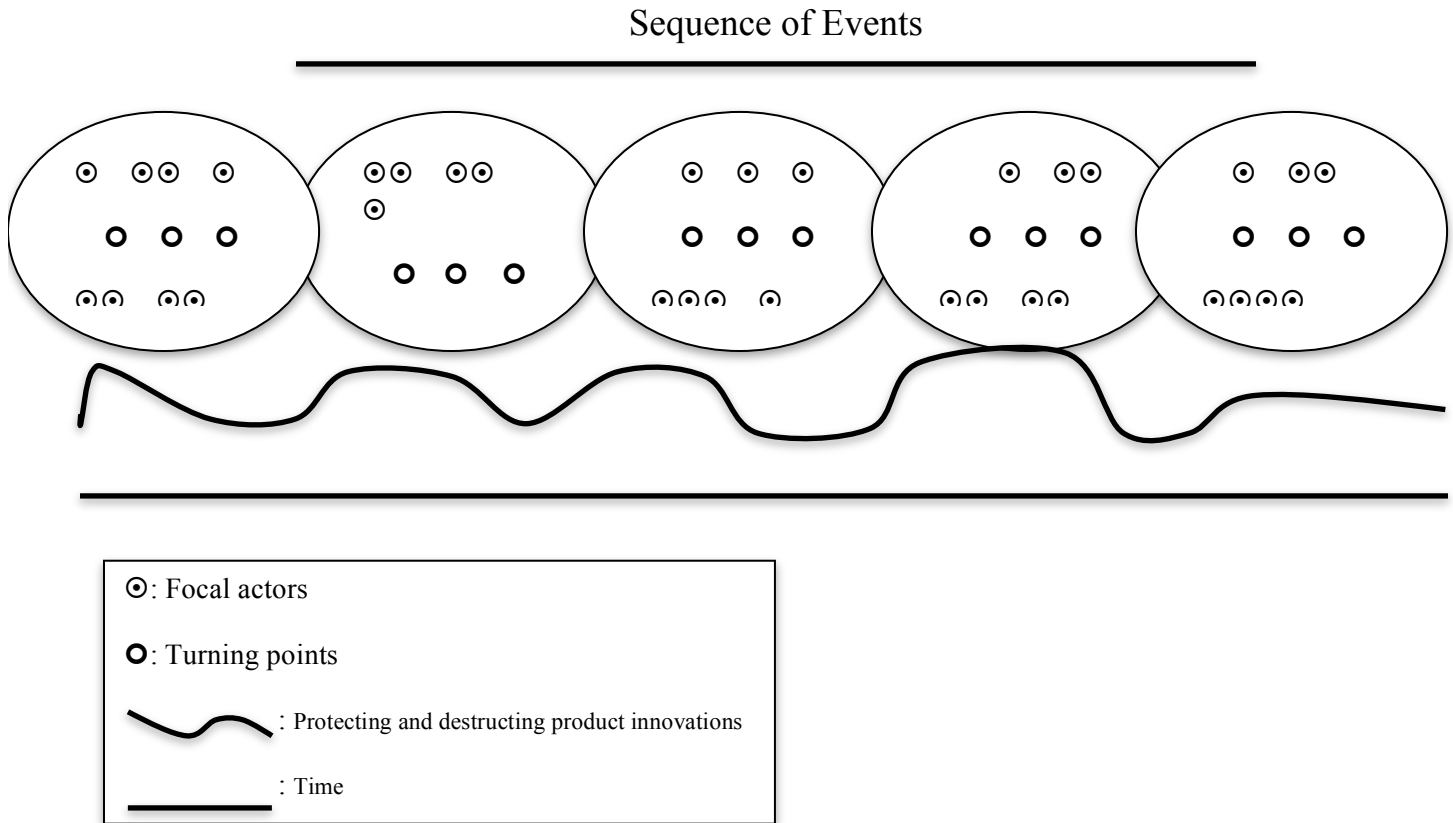


Figure 2: Summarization of the adopted narrative analysis

To analyse the separated responses of the participants, which are distinct in terms of content and time in a harmonious manner, I decided to use the qualitative data analysis software “NVivo”. This software was used firstly to code the interview transcripts and then to group similar answers/responses. Put simply, NVivo was used to create files that compromise those answers that are given in different interviews and relate to the same critical incident. That allowed me to analyse answers pertaining to the same critical incident together thereby enabling me to detect similarities and differences between those answers. The use of the software increased the consistency in my analysis of the

generated data and eventually resulted in more accurate and coherent interpretations of these data.

3.9 Developing the *Alpha* case study

3.9.1 Choosing *Alpha* case study

The decision to choose a specific firm to be investigated longitudinally is usually accompanied by a degree of caution. Stake (2008) emphasized that to investigate a case study that aims to comprehend a specific phenomenon, it is crucial to choose one in which a superior learning opportunity about the phenomenon under investigation is likely to be attained. He emphasized the learning element in choosing the case study as a way to distinguish the investigative cases that should magnetize researchers from these typical cases. Therefore the first question that was asked prior to selecting the *Alpha* case was: “How much learning can this case offer to the investigator?” The willingness of the participants, especially the main participant, **Thomas**, to cooperate and provide infinite data, time and efforts to this research was an explicit pointer about the amount of learning and knowledge that could be acquired by investigating the *Alpha* case. This willingness to cooperate extremely affects the course of action that is undertaken by the researcher while conducting his research interviews as the constraints of the participants’ hospitality and the access to those participants restrict the researcher’s opportunity to learn (Stake, 2008). The semi-longitudinal nature of the *Alpha* case study was also a further catalyst to select it as it allows a greater anatomy of the investigated incidents and events that are pertaining to the case and can also allow the researcher to assign causality. Harrison and Easton (2004, p.195) argued that the case that offers an opportunity to longitudinally investigate a process could be seen as a “crucial advantage in being able to assign

causality”.

3.9.2 Access to *Alpha*

The access to *Alpha* project occurred through exploiting the preceding relationships of the supervisor of this research with some of the automotive manufacturers. This resulted in preliminary telephonic and electronic contacts with **Helen** who holds a project manager position in **SHAMMA** (the company that manages *Alpha* project). She has previous and current experience in managing and supervising projects within the area of automotive innovations and technologies. **Helen** was interviewed to seek a generic perception of the innovation projects developed by **SHAMMA**. After engaging in a series of negotiations over one month to reach an agreement on conducting a series of interviews with those who actually and daily engage in the development of innovation projects, another employee, **Thomas**, was recommended by her to be interviewed. **Thomas** has a vast knowledge in developing automotive innovations and technologies and direct involvement in a recent project, *Alpha*, that complies with the type of projects this research originally seeks to investigate and the type of projects that can attain the objectives of this research. **Thomas** was introduced to the researcher in November 2013. After initial contacts with him, it was evident that his contribution could boost the accomplishment of this research for a number of motives. First, he has a long-serving engagement in developing automotive technologies and innovations through working for two automotive manufacturing giants. This assured the researcher that he would be knowledgeable enough to perceive the purpose and the tenor of the current research. Second, his direct and daily participation in *Alpha* for the sake of developing innovative vehicle protection bags lured the researcher to consider that project as an ideal case study

in which he can empirically examine the theoretical insights of his research. This is attributable to the fact that **Thomas**, as an automotive project engineer, was at the heart of *Alpha*. As an observer he can delve into the details of the critical incidents occurred during the development of the vehicle protection bags and deeply elucidate them in a way that enables the researcher properly to understand them and chronologically explain them as unique events. **Thomas** was therefore interviewed as the main participant in this research commencing November 2013 for a consecutive ten month period. During this time, three other participants (**Tim**, **David** and **Steve**) were added to the participants' list through relying on the "snowballing sampling" technique in which the researcher strengthened his relationship with **Thomas** and accordingly asked him to invite other people who participated in developing the innovative vehicle protection bags to take part (Figure 3). While **Tim** and **David** are the two other automotive project engineers who were part of the team that undertook the *Alpha* project in addition to **Thomas**, **Steve** is the senior manager who commanded and supervised that team. A total of twelve interviews were carried out with these five participants between November 2013 and August 2014. The length of each interview ranged from 30 to 70 minutes. Most interviews were held outside the official workplace of the participants in response to their request and were based on their own convenience. Very few interviews were entirely by telephone. These formal interviews were usually complemented by informal telephonic interviews for review purposes. All these interviews were recorded, transcribed, archived and stored. In addition to the twelve interviews conducted with *Alpha* team members, three supplementary interviews were held with three automotive industry practitioners whose expertise in developing innovation projects is considerable. The participation of

¹ Participants' names mentioned above are anonymous.

those three automotive experts was embodied in two specific aspects. First, they were asked to give deep explanations on how automotive firms initiate innovation projects. Second, they were asked to detail the process in which these firms terminate such projects. Although those interviewees are ancillary to the case under study in this research, significant benefits were reaped as a result of their participation. In line with what Yin (2003) called for with respect to the necessity of having multiple experiences on any single setting that is under investigation, the participation of those experts allowed me to multiply the thoughts and experiences related to the case of the current research. Most importantly, I exploited the fact that the three experts were external to the case under study, so that I could delve into a deeper level of data that I could not reach during the previous interviews with *Alpha* informants for reasons of confidentiality stipulated in their firm's code of conduct. Consistent with the ethical assertions of the current research, the real names of the project under study and its parent firm, as well as the real names of all informants, were substituted with anonymous names.

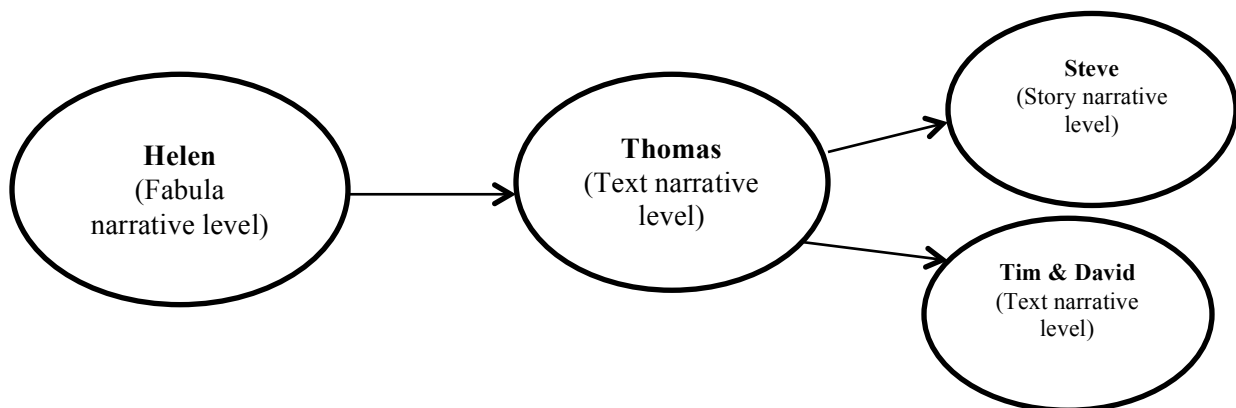


Figure 3: Reaching *Alpha*'s participants

3.9.3 Distributing the interviews among participants

The focal point of the current research is hinged on tracking and analyzing the crucial incidents that took place when *Alpha* relied on its firm's innovative dynamic capabilities to develop innovative protection bags for the firm's vehicles. The intention was to convert these incidents into unique critical events. As a consequence, most interviews were carried out with **Thomas**. **Thomas** was seen as the framework for the current case study and the primary generator of the data needed to develop the case owing to his lengthy participation as a project engineer in *Alpha* and his explicit desire to support the current research up as much as possible. After a preliminary analysis of the data generated by **Thomas**, the findings of **Thomas's** interviews have been matched to those pertinent critical incidents that were pointed out by the other participants. This implies that the case study presented in the next chapter is primarily developed based on the data generated by **Thomas** in addition to the related data generated by the other participants and the reflective notes taken after the analysis of data. The form, context and content of the case study are developed in relation to the theoretical insights presented in **Chapter Two** in which the innovative dynamic capabilities were defined, explained and categorized from a structuration perspective.

3.9.4 Context of interviews (formal and informal interviews)

Chell (2004) prompts researchers to maximize participants' understanding of their studies' objectives and purposes through giving them some preceding explanations of these studies. In this research each interview, in particular the formal ones, was preceded by a concise explanation so they could absorb the aim of the interview and its components. In the early interviews, this was followed by some assurances giving to the

participants in relation the protection of anonymity, confidentiality and other ethical rights. The formal interviews can be best characterized as semi-structured, because pre-determined questions were asked to all participants. However, taking consideration of each participant's desire to illustrate the tenor and significance of his own experience, each participant was given some independence to narrate his personal story and experience by letting him express his own emotions, opinions and reactions to a specific incident (Cope, 2003). In contrast, the informal interviews were mostly carried out by telephone in the time that separated the formal interviews from each other. These telephonic interviews did not usually exceed 20 minutes. They are best described as bilateral discussions in which the interviewer and the interviewee reviewed and reflected on the previous interviews with the purpose of enhancing the reliability of these interviews' data.

3.9.5 Content of interviews (investigating critical incidents)

While conducting the formal interviews, each participant was asked to retrieve the stages that *Alpha* has undergone from its early initiation at the beginning of 2012 until the day of the interview. This was due to the need for a specific account of the critical incidents that sequentially occurred while developing the innovative vehicle protection bags. The development of such account is implemented through the critical incident technique (CIT) introduced by (Flanagan, 1954). He defined this technique as “a set of procedures for collecting direct observations of human behavior in such a way as to facilitate their potential usefulness in solving practical problems and developing broad psychological principles” (ibid, p.327). In a comparable experience to that of Cope (2003), the participants were willing to enumerate and narrate the critical incidents based on

occurrence date instead of showing them a pictorial representation of *Alpha's* time framework since its first day and asking them to identify when each incident emerged on the pictorial representation. As a consequence, the participants were able to demonstrate those incidents without rigid requests to do so. This allowed each participant to determine the preferable mechanism by which to explain those incidents as short tales prior to discussing them and tying them to each other. This is congruent with Orr's (1995) emphasis on the significance of allowing participants to tell stories in their own voice first. Such stories are not only reflective, they also clarify the way in which each incident or event was shaped due to the fact that those tellers who were in effect the shapers of the incident being explained.

In order to generate rich and lengthy data on the critical incidents being explained by the participants, it was imperative not to rely only on the pre-determined questions. It was important to take further steps and complement these questions by some probing questions such as, "When did that happen?" and "How did you overcome this?" This is proportionate with Chell's (2004) view that process researchers are required to ask some probing questions to help them gain better understanding on the incidents being explained by the participants of their research. Cope (2003) also promoted the process researchers to do so as he feels this interference can lead participants to provide elaborate reflections on the incidents being discussed from their personal views. However, overuse of this type of probing questions can result in absolute control of the interviews by the interviewer as Chell (2004) warned. As I was fully aware of the risks of excessively intervening with the participants I only asked probing questions when I felt my perception of the incidents needed to be widened. In those cases I would ask questions like, "How did that happen?"

and, “Why did you take that decision?”

By following such an approach, I was able to obtain a string of explanations of critical incidents pertaining to the informants’ observation and experience while working on *Alpha*. Such explanations comprised the context of the critical incidents like which motives resulted in these incidents, the intents of the informants (actors), and the consequences of the incidents. This implies that the data generated during these interviews were sufficient to give elucidations of context, strategy and outcomes. As Chell (2004, p.56) explained, “the linkage between context, strategy and outcomes is more readily tested out because the technique is focused on an event, which is explicated in relation to what happened, why it happened, how it was handled and what the consequences were”. Following this approach also facilitated the identification of the four conditional causes (material, formal, efficient and final) that are required to convert the critical incidents that were generated during the interviews in the form of raw data into unique events (Van de Ven, 2007). This identification was attained by gathering: (i) context data, in which the components that formed the activities that created the incidents were revealed; (ii) strategy data revealing the mechanism in which the activities that created the incidents were executed; and (iii) outcomes data that revealed the motives and inducements for which the activities that created the incidents were executed.

3.10 Ethical considerations

I first complied with the university’s ethical protocols through the submission of the university’s ethics application form required for data collection (generation). The form has been reviewed and approved by the university’s ethics reviewers (see Appendix 3). In addition to meeting the institutional ethical standards, I emphasized the ethical stance that

pertains to the participants themselves. This stance comprises three critical aspects. First, the confidentiality of responses was given a high priority and was significantly considered in the present research. Access to the case study under investigation was directly controlled by the interviewees themselves. I managed to protect the generated data through securely storing them either electronically or in hard copies. Additionally, the use of the generated data was limited to the current research and the participants were informed enough about the way in which their data were stored and used. Second, the anonymity was highly emphasized and was offered to the participants in a formal way. This procedure is a mechanism of protecting participants in cases where they provide data that might be detrimental to their career in the firm's under investigation. Therefore, the names of the participants, the project and the firm under study were all anonymized. Third, the independence of the participants was taken into account as I decided not to stress the participants into making unwilling comments. I did not also persuade them to generate further data if they were unwilling to continue their participations in the present research. These three aspects were strongly emphasized in the available informed consent form that I used to seek the approval of potential informants for participating in the present research (see Appendix 4).

3.11 Methodological limitations

Due to its longitudinal nature and its containment of key investigative elements, this research was purely qualitative. Even though the utilization of qualitative interviews as a data generation method appears to be imperative for the current research, it entails some limitations. First, drawing upon interviews to generate data was laborious and time-consuming as it took a significant portion of my own time in preparing for the interviews

and frequently time spent travelling to conduct them, taking into account the vast majority of the interviews were taken place out of my residency city (Sheffield) and each took 30 to 70 minutes. Second, owing to the time-consuming issue associated with conducting the face-to-face interviews, the number of participants was limited to just eight. Some of the targeted participants apologized for the participation in this research due to their frequent travel and continuous work obligations. They were not interested enough to take a part in the current research due to time restrictions. This resulted in the inability of carrying out some interviews with the senior management people who were in charge of the planning and the development of *Alpha*. This limitation was overcome by conducting few interviews with a leading participant (**Steve**) who was authorized enough to regularly attend **the steering group's** meetings that were held to discuss the planning, development and extension of *Alpha*. Third, as *Alpha* project was ongoing in the time I was seeking data, there was a robust desire to access into the manufacturing plants where *Alpha's* activities were taking place for the purpose of observation and taking reflective notes. However, this desire was not attainable as the access to such plants was confined to authorized personnel. This limitation was solved by conducting a series of lengthy interviews with a direct participant in *Alpha* (**Thomas**) with the intention of increasing the deepness and richness of generated data, so that the unseen information can be compensated. Fourth, conducting face-to-face interviews was a costly mean of data generation compared with postal questionnaires as it entails some expenses that resulted from frequent travelling via different transportation means for interview purposes.

3.12 Personal reflections on the research journey

Embarking on a doctoral project is a challenge considering the number of difficulties

associated with each stage and its length. However, people usually have various perspectives on such a journey, as some of them consider it as optional and idealistic, while others see it as necessary and realistic. I view my doctorate as an opportunity for growth and development given that it has contributed to enhance my learning and intellectual capacities, my professional career and, above all, my personal attitudes. Such gains would not have been possible without dedication and commitment to the doctorate project. This research could not have been achieved half-heartedly. Reflections on specific stages of my PhD journey are presented below.

In the initial period (September to December 2012) of my PhD, I came to understand the nature of a doctoral thesis and how it differed from a Master's degree dissertation. This period was also characterized by confusion owing to the considerable effort needed to examine the various knowledge sources, notably, journal articles. In the subsequent period (January to March 2013), the research focus was narrowed, and, with advice from my supervisors, I agreed to eliminate marketing and networking dynamic capabilities from the research and to limit the work to innovative dynamic capabilities. In addition, I chose the structuration theory as the framework to explain how dynamic capabilities can be used through the duality of structure and agency. Following this (April to October 2013), I experienced the difficulties of appropriately merging the three academic perspectives/fields of the current research (dynamic capabilities, structuration and innovation) into one framework. This period was characterized by considerable stress stemming from rewriting the literature review chapter. However, I was able to tolerate such stress because of my supervisors' guidance. As a consequence, I could finalize the literature review chapter, as well as the methodology chapter. The period from November

2013 to August 2014 was also a stressful one owing to the difficulties associated with the accessibility of the data, especially taking into account that some of the research participants had professional obligations, which required them to postpone the scheduled interview meetings more than once. These difficulties, however, were to some extent eased by explaining to the participants how such delays can affect the progress of my research. Between September and December 2014, I was able to analyze the generated data and finalize the findings of the *Alpha* case study (**Chapter Four**) and the outcomes that resulted from integrating the materials of the case with the theoretical accounts of the research (**Chapter Five**). However, this did not last long as I felt the pressure again while writing the discussion and conclusion chapters in a relatively short time between January and February 2015.

Overall, the ups and downs of research are an integral part of any doctoral journey including my own. At the end, with determination and constant backing from supervisors, family and friends, something great happened and the objectives were achieved. This project proves again that success in academic research projects is in the first place driven by persistence and human relationships if we take into consideration the swiftly changeable reality we live in.

3.13 Chapter summary

In this chapter, elaborated explanations about the methodology of this research project have been provided. The chapter has clarified the reason behind relying on process and critical realist ontological and epistemological stances. It has also explained why adopting an abductive research approach through using a case study research strategy is a preferable option for the current research. It has also discussed the selection of three data generation/collection methods as well as outlining the motives behind using a narrative

data analysis and explaining the mechanism in which this analysis will be used. It has also offered detailed information about the case under investigation in terms of accessibility, participants, content and context of interviews. It has concluded by highlighting some methodological limitations and ethical considerations as well as personal reflections on the researcher's PhD journey.

Chapter Four: The *Alpha* Case Study

4.1 Preface

The preceding chapter detailed how the *Alpha* case study was selected and encountered, as well as how the interviews were distributed among the case's participants. It also expounded the context and content of the case and the way in which its data were coded and analysed. Relying on this, this chapter is designed to refine the theoretical insights discussed in this thesis through a semi-longitudinal investigation of the mechanism in which an automotive firm (SHAMMA) structurally develops, maintains, extends and destroys an innovation project (*Alpha*) via a reliance on its innovative dynamic capabilities.

In order to elucidate the necessity of structuration theory in comprehending the use of innovative dynamic capabilities in innovation projects and initiatives, I decided to scrutinize such a project in which **the Executive Committee of SHAMMA**, notably **the quality director**, sought to develop a new innovation with the intention of encountering the increasing guarantee claims generated by its dealers across the globe. This case study is derived from 15 in-depth semi-structured interviews carried out with the automotive project engineers of *Alpha* (**Thomas, Tim and David**), a project manager working within **SHAMMA (Helen)** and a senior quality manager of *Alpha* (**Steve**), in addition to further supporting interviewees mentioned in the previous chapter. During these interviews, special assurance was placed on the critical incident technique coined by Flanagan (1954), in order to comprehend the distinct experiences of the selected participants towards the development, extension and termination of *Alpha*. As a consequence, 13 consecutive critical incidents have been discovered and detailed. This chapter separately

presents each critical incident by keeping an eye on specific elements such as the time sequence of a series of incidents, the focal factors that caused them, the motives for their occurrence, the ingredients required for them to occur, their relational effect and the outcomes.

4.2 Organizational information of SHAMMA

SHAMMA is a large automotive manufacturing firm. The origins of the firm can be traced back to the 1920s and their headquarters are located in the United Kingdom. Although the firm entirely implements its engineering, design and manufacturing operations in plants within the United Kingdom, with revenue over £15,000m in 2013, a worldwide grid of dealers and an aggregate of 26,000 employees driving its operations across the globe, they are evidently proving their global presence. The firm is currently amongst the top five investors in technology, innovation and research and development within the UK manufacturing sector, with an ambitious plan to continually spend £1.5bn each year on the process of product creation and its associated innovation projects until 2016. This urges the firm to develop novel innovative solutions in diverse aspects of automotive innovation. Quality was one of those aspects in which **SHAMMA** has decided to invest in by developing several projects, one of which is *Alpha*, which can enhance the ultimate quality of their products.

4.3 Alpha project

In 2008, **SHAMMA** came in an unsatisfactory position in the JD Power Survey of customer satisfaction and the firm described its position in that survey as “unpleasing”. In response to this, the firm replaced its **director of quality** and reassessed the quality policy for its entire supply chain. A string of areas for improvement were identified as a

consequence of the new assessment of the firm's quality policy. As a part of these improvements, a high priority was given to protecting the vehicle exterior surface. At the beginning of 2012 the firm came up with the notion of allocating a portion of its **Quality Division's** financial resources to develop *Alpha* as an in-house specific project aiming at innovatively protecting the vehicle exterior surface. The core of *Alpha* was to innovate pioneering vehicle protection bags that can be introduced as an instrument of reducing the increasing warranty claims received by **SHAMMA** and thus improving the perception of its organisational and individual customers as well.

Unlike its rivals such as **Honda**, **BMW** and **Volkswagen**, **SHAMMA** does not have a network of assembly plants across the globe as it still concentrates all of its production activities in the UK. This increases the possibilities of exposing the exterior surface of its exported vehicles to the hazard of damage and deformation, taking into account that **SHAMMA's** vehicles are exported to the furthest regions such as the West Coast of the US and the East Coast of Australia. So, as every **SHAMMA's** vehicle is designed, assembled and manufactured only within the boundaries of the firm's three vehicle manufacturing plants in the UK prior to exporting them across the globe, it was vital for the firm to provide sophisticated protection for the exterior surface of every exported vehicle so that it can ensure unscathed arrival to its dealers at the port of entry in the respective importing country. As a consequence, three different categories of vehicle protection bags have been developed for different travel distances and different markets. Category one is made of a minimum set of protection items and is only used within the UK market, as these **SHAMMA** vehicles will not travel a long distance and thereby the chances of the vehicles getting damaged will be considerably less. It also enables the firm

to economise on the costs of putting plenty of the protection items in that category. Category two is specifically designed to protect the horizontal surface of the vehicle, which includes the bonnet and the top surfaces. This category is designed to protect the vehicles that are shipped to the European market. Category three provides advanced protection for the complete vehicle and is developed for the rest of the world.

Category	Protection items	Markets
One	Minimum protection items	UK market
Two	The whole horizontal surface of the vehicle	EU market
Three	Complete protection	Rest of the world

Table 1: Categories of vehicle protection bags for SHAMMA’s vehicles

The *Alpha* project is directly administrated by **the Quality Division** of SHAMMA. The initial budget of the project was set by the senior executives at **the Quality Division** as £4 million, before they further increased it to the level of £5 million. The senior management of **the Quality Division** decided to allocate four of its personnel to take responsibility for *Alpha*. Three of them were automotive project engineers (**Thomas, Tim** and **David**) and the fourth (**Mike**), who was quite senior to the rest, was a project leader. The project’s meetings and activities took place at SHAMMA’s principal engineering center in **West Central England** as well as three different vehicle manufacturing plants, two in **West Central England** and one in **North West England**, in which each project engineer was accountable for developing a vehicle protection bag for a different vehicle line of SHAMMA cars. The four team members responsible for

Alpha were directly linked to **the body engineering quality manager (Steve)**, who reports to **the quality engineering director**, who in turn also reports to the entire **steering group** at a bi-weekly meeting to discuss the progress and the requirements of the firm's projects including *Alpha*.

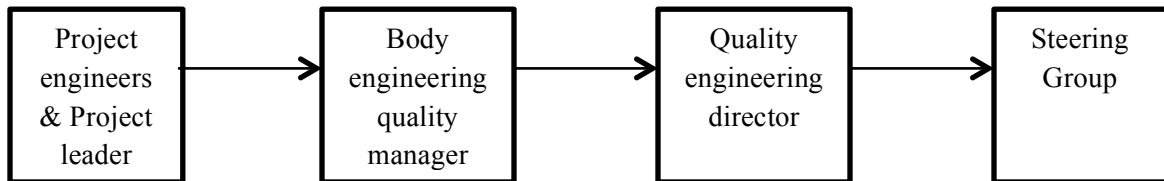


Figure 1: Relationship map of SHAMMA's personnel engaged in *Alpha*

4.4 Critical incidents of *Alpha*

After conducting 15 interviews with *Alpha*'s participators and other related interviewees, 13 consecutive critical incidents have been identified during the multiple stages of *Alpha*'s life, beginning with the planning of developing the *Alpha* project and ending with the termination and handing over of *Alpha*. These incidents are consecutively listed below.

- 1- Planning for *Alpha*
- 2- Start of developing *Alpha*
- 3- First supplier's arrival
- 4- Start of standard development
- 5- Start developing protection bags for different vehicle lines' cars
- 6- Second and third suppliers' arrival
- 7- Overlap of tasks
- 8- Recyclability restriction
- 9- "Show car" event
- 10- Final amendments and submission of the standards

11- Completing the protection bags for the first vehicle line's cars

12- Turnover of *Alpha* members

13- Termination and handing over of *Alpha*

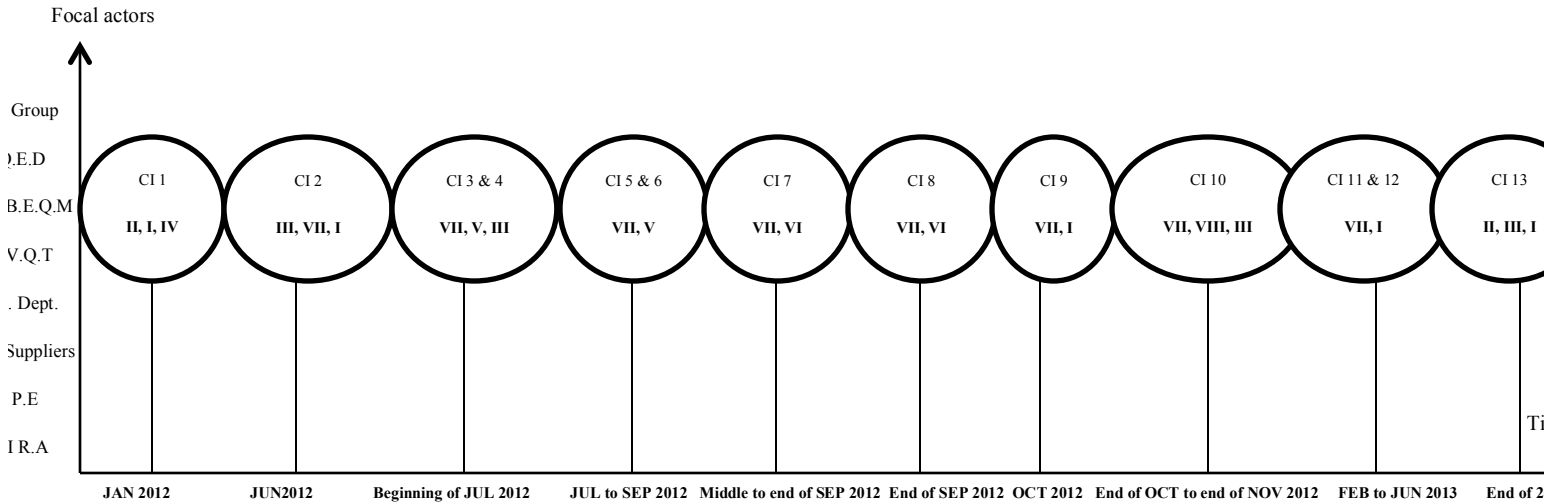


Figure 2: Graphical representation of *Alpha's* critical incidents

- S. Group: Steering Group
- Q.E.D: Quality Engineering Director
- B.E.Q.M: Body Quality Engineering Manager
- V.Q.T: Vehicle Quality Team
- P. Dept.: Procurement Department
- P.E: Project Engineers
- R.A: Reviewers & Approvers of the standard

4.4.1 Planning for *Alpha*

Due to the continuous waves of complaints faced by **SHAMMA** as a result of its vehicles' exposure to different types of damage while exporting to overseas dealers, the firm became obsessed with the issues of spending a considerable portion of its financial resources on warranty claims and exposing the quality of its vehicles to doubt campaigns, which resulted from the notable drop of its customer perception level as derived from some reliable surveys. This encouraged the firm, represented by its senior management, to devise lasting solutions for both issues. Since these issues fall within the jurisdiction of **the Quality Division** of the firm, **the Executive Committee** of **SHAMMA** submitted a formal request to the firm's **Quality Division** to initiate a plan for a project that has the potentiality of overcoming the underlying problems identified earlier. **The Quality Division**, as a consequence, started the planning process for the project at the beginning of 2012 and named its **quality engineering director** as the lead official. **The quality engineering director** commenced the planning process internally within the border of the division first before inviting other key personnel from other divisions/departments to intervene in the process. The internal planning began with the aim of looking beyond the boundaries of the firm by scanning the automotive industry and reconnoitering the existing innovations developed by **SHAMMA's** direct and indirect competitors for the same purpose in order to partly seize a pioneer imitation opportunity. The initial intention was to bring in the essence of a developable innovation concept from outside and then combine it with the creativity possessed by **SHAMMA** in order to customise it to the firm's vehicles as well as eliminate the transactions costs associated with developing innovations from scratch.

Helen: ‘For a small technology or innovation project, we will be looking at our competitors to see if they have it or not: if they already have it, we will try to find a strategy to copy it as soon as possible. For minimum of three to six months research, the technology or innovation will be within us. If it is a new innovation, it is going to be definitely a minimum six to eight months.’

However, **the Quality Division** exhausted the time set by **the quality engineering director** to sense the imitable related projects of their rivals without proper findings for reasons mostly pertaining to obviating the need for such a project in relation to those competitors, as they have global production facilities (their vehicles are not exported to remote distances) and **SHAMMA** do not. As such, it becomes imperative for them to consider alternative options.

Steve: ‘Quality is normally something that is not an option. If it’s just fixing something that’s quality related then there’s not a choice to be made – we must simply fix it.’

The Quality Division consequently capitalised on its firm-specific advantage and internal know-how to eventually generate the concept of innovative vehicle protection bags. The core principle of such bags is to coat the entire exterior surface of **SHAMMA’s** vehicles with double protection breathable bags that are resistant to severe climatic conditions in order to prevent them from being exposed to any sort of deformation during transference to overseas dealers. Driven by strong design logic, the concept of the vehicle protection bags succeeded in attaining a high level of acceptance within **the Quality Division**. Following such success, the focus of the division was then turned into refining, verifying and validating the generated concept and the design of the suggested protection bags. **The quality engineering director** played a major role in doing so as he was the person who firstly identified the design features of the protection bags, secondly devised the quality procedures and specifications needed while developing them and then drew

the outline for the verification and validation procedures that the development of such bags should be subject to. The refinement process of the concept was not limited to this; it also included the consideration of standards (design and environmental rules) that are likely to be applied to the vehicles that will be subject to the potential protection process.

Steve: ‘Those standards are based upon requirements of the people that are going to use the car or deliver the car and the standards we have for protection are based upon the requirements of the people who transport the car to the dealer. So those requirements define the protection that’s needed.’

As **the Quality Division** managed to depict the fundamental purposes of the solution suggested for addressing the emergent problem under consideration, which is the growing warranty claims received by the firm as an outcome of the exposure of its exported vehicles to damage, it became vital to bring in external “minds” from other related departments to the circle of decision-making for the purpose of assessing the practicality of the generated concept from a “neutral” perspective. As a consequence of this, the feasibility of the proposed project was included in the agenda of the senior management, which was discussed in-depth in a series of **steering group** meetings. **The steering group** is a senior team that comprises key representatives from the fundamental departments of **SHAMMA** such as the **manufacturing** unit, and the **procurement** and **finance** departments, which meet bi-weekly to review the status of the firm’s existing projects and discuss the feasibility of its proposed future projects in addition to providing the required resources, facilities, direction and accountability.

Thomas: ‘This project originally aimed to reduce the warranty claims received by our dealers across the globe and increase the pride value of our firm as well as improve the customer perception of our products. So, that clearly indicates a marketing need or motive behind the establishment of this project, which provided a robust link with one of

the mainstream activities in our company: marketing. The second thing that I can point out is our relationship as a team responsible for this project with the purchase and finance teams, as this project was clearly funded by them. The finance team was crucial to providing us with the required financial resources to operate the project; they were needed in order to inject the right amount of money into this project's account from time to time. The purchase team was needed to procure the required materials, assess the prices of these materials and make sure our purchases complied with the firm's policies. So, during each steering group meeting, there were representatives of such mainstream departments attending. They were able to delve into the details of our project and make sure everything complied with the larger policies of the firm.'

With respect to *Alpha*, **the steering group** led by **the quality engineering director** first examined the feasibility of the project from an economic perspective by calculating how much the firm is currently spending on warranty claims each year. The group also assessed how much the firm is expected to spend on the proposed project until its termination and how much it can save the firm in financial resources. As *Alpha* demonstrated the economic feasibility of developing the vehicle protection bags, **the steering group** then took a further step to examine another aspect of the project, which was the project's scope (the activities, facilities and norms needed to develop the innovation). This is because the innovation scope (the characteristics, the design and the functionality of the innovation) is considered as division-specific knowledge and was already identified within the boundaries of **the Quality Division**.

Steve: 'With those developments, you should expect some gateways; you have to go through certain steps and gateways first of all. For a quality project you do need to get approval that the project's going to proceed and it is feasible to go forward with and then you have to make sure that you've designed it correctly. You have to make sure that you've come up with the most appropriate solution and then you have to implement that solution. So there are gateways to go through, yes.'

The steering group started reviewing the practicality of *Alpha* (the project scope) by

discussing the amount of human resources needed to deliver the potential innovation. After various dialogues that tackle questions on this aspect of the project, the members of **the steering group** decided to appoint four individuals plus one to take responsibility for the development of the protection bags. While the four individuals were given full-time roles within the project, as three of them (**Thomas, Tim and David**) were automotive project engineers and the fourth was a project leader, the plus one (**Steve**) was given a part-time supervision role in the project that kept him accountable for other activities related to his position as **the body engineering quality manager of the Quality Division**. Prior to their decision of appointing **Mike** as a leader of *Alpha* project, **the steering group** paid attention to some specific qualities that should be acquired by the individual who will occupy such a position. Although the sum of experience possessed by **Mike** in the domain of body engineering vehicle protection (over 20 years) was a motive behind his new appointment, the key milestone behind this appointment was embodied in his genius in targeting the preferable related suppliers, appraising their capabilities and above all identifying the project scope in a way that is harmonious with the interests of those suppliers. Following their discussion about the recruitment aspect of the project, **the steering group** then moved to discussing its time and budget aspects. The approach adopted by **the steering group** in identifying *Alpha's* timeframe was to set three different time locks for the project, which are start date, duration and end date. The start date was set to be the 25th of June 2012 and the end date was set to be 25th April 2013 with the project's duration set at 10 months. In addition to setting the timeframe of the project, a number of discussions took place within **the steering group** with the direct involvement of the **finance** and **procurement** departments in particular in order to set the

potential budget. Taking into consideration the probable duration of the project, its direct expenses, which are the expenses spent on the project's permanent resources including the costs associated with hiring the four team members and the administrative costs and its indirect expenses, such as the costs associated with purchasing the required materials and equipment and the costs stemmed from contracting with external parties, **the steering group** set a baseline budget of £4 million for *Alpha*. **The steering group** ended the string of their planning and preparations meetings by discussing the contracting policy that will be embraced for the project and determining its key priorities. They chose to follow a gradual policy in contracting with the required suppliers as they decided to start with only one "superior" supplier to develop the "prototype version" of the vehicle protection bags for all the vehicle lines. They will also develop the "production version" of these bags for the firm's cars produced at its first vehicle manufacturing plant in **West Central England** prior to recruiting two or three further suppliers to develop the "production bags" for the cars produced at the firm's other plants. They also decided to prioritize the development processes of the protection bags of the firm's different car models based on the novelty and importance of these models. As such, great emphasis was placed on the models produced at the firm's first vehicle manufacturing plant in **West Central England**, as they will be the forerunner models when the project develops its first batch of its complete protection bags.

4.4.2 Start of developing *Alpha*

As a decision was made to recruit **Mike, Thomas, Tim** and **David** as *Alpha's* executive team, the efforts of **the Quality Division and the vehicle quality team** chaired by **the quality engineering director** was then concentrated on converting the concept of the

project into action starting from the 25th of June 2012. On the first day of the project, the objective of the senior management of **the Quality Division** was to pull *Alpha's* team members together for the purpose of creating homogeneity and a common mindset among both them and the senior management. The few subsequent days were seen as a period of coping with an information overload and receiving intensive explanations as **the Quality Division** was keen on informing them about their individual roles and the way in which they should govern as well as deliver the various assertions that **the steering group** has in respect to *Alpha*. The period of information overload was driven by two specific types of meetings: one held by **the body engineering quality manager (Steve)** to inform the team members about their own roles and any associated safety rules and institutional legalization requirements, and the string of meetings held by **the team leader** to detail and explain the emphases of **the steering group** to the rest of the team.

At first, *Alpha's* team members attended a meeting held by **the body engineering quality manager** as a representative of **SHAMMA's Quality Division**. In this meeting, the notion and the objective of the project were illustrated to the team members in an elaborate way, a collective task was given to them and an individual task was also assigned to each. The collective task was represented in developing the standard of the vehicle protection bags – this was a genuine document that defined everything regarding a new technological paradigm or innovation; for instance, it explains what materials the vehicle protection bags should be made of, the amount of those materials, the design rules and the environmental governmental-institutional requirements of the protection bags. Then, they identified the features of the vehicle protection bags and the physical characteristics of the materials used in developing them and how to co-operate with

suppliers in developing the prototype (the initial version of the vehicle protection bag) and the production bag (the definitive version of the vehicle protection bag).

Individual tasks were represented by each *Alpha* automotive project engineer being given an order to work on developing a protection bag for a specific vehicle line's cars in a different manufacturing plant. During this meeting, **the body engineering quality manager** also clarified the mechanism within which the members of *Alpha's* team should interact with each other and with the other internal and external parties while developing the vehicle protection bags. There were no specific codified rules or formally written codes to govern that interaction; instead, there were some instructions pertaining to the way in which the team members should communicate and refer to each other to the upper organisational levels and the external actors. In this regard, the three automotive project engineers were asked to refer to their **team leader** in case they needed some clarifications or answers to their inquiries from the upper organisational levels or **the steering group**. **The team leader**, therefore, was appointed as a point of contact that connected the rest of the team with other organisational departments. Some assertions in relation to the time frame and deadline of the *Alpha* project were also a part of that meeting's agenda, as the team members were firmly asked by their **body engineering quality manager (Steve)** to be committed to a specific deadline (February-April 2013). The team members perceived that as a development cycle rather than a deadline, as they were aware enough of that cycle, knowing when each specific development stage should start and end.

In addition to discussing the individual and collective duties assigned to the team members, further discussions were raised at that meeting about which institutional

legislations and safety rules should be taken into account while developing the vehicle protection bags. Institutionally, some of the 179 countries that **SHAMMA** exports its vehicles to impose strict legislations on each imported vehicle provided with protection items for its exterior surface, including the protection bags. Therefore, it was vital for **the Quality Division** to make the *Alpha* team aware of such legislations for the purpose of not consuming the project's resources by developing protection bags for the vehicles exported to those countries.

Thomas: 'I don't remember a particular rule or legislation as such, but there were many. I'm certain that there were a few rules because when a vehicle goes to a particular market you should obey those rules and regulations. Once we started working with these vehicle bags, I remember that we stopped working for the Russian market I believe, because the Russian and the US authorities can't allow in a vehicle with a bag on it. See, that's a big thing and a big piece of legislation in fact.'

From a safety perspective, the hazard of transferring a vehicle with a bag on it from the vehicle manufacturing plant to the port of exit through a truck was discussed in some detail in that meeting. **The body engineering quality manager (Steve)** highlighted some precautions in order to avoid the possibility of the vehicle being exposed to damage during its relocation to the port of exit as a prelude to exporting it.

Thomas: 'You should have a rear opening that is see-through and you should put transparent film on the rear seat as well because, when you are driving, you should be able to see on/over your shoulder. It was also important to have a see-through transparent cut out on the brake lights on the back as well, because if you are driving in daylight and if you have a completely normal fabric, and you're about to stop, the person coming behind can't see the red light because it's daylight. It may not be very bright sometimes or, if it *is* in very bright sunlight, when you press the brake and we've covered it with fabric it can't be seen. These are some examples of the technical rules that we were taking into account while working on the bags.'

The first meeting was followed by a series of successive meetings held by **the team**

leader of *Alpha's* team (**Mike**) to convey the assertions of **the steering group** to the minds of the rest of *Alpha's* team members. As **the steering group** comprises of representatives of different departments across **SHAMMA**, several heterogeneous affirmations were raised by those representatives during the first **steering group's** meeting, which **Mike** attended. The affirmations of three particular departments were given a high priority by **the team leader (Mike)** as he urgently delivered them to his team subordinates in his first series of meetings with them. These are the affirmations of the **manufacturing** units, the **finance** and **procurement** departments and the **engineering** teams. At the level of the **manufacturing** units, the fundamental emphasis was represented in that all the processes pertaining to the design, alterations and validations of the vehicle protection bags should be implemented in a congruent way with the vision of the **CME** (Current Manufacturing Engineering) and the **AME** (Advanced Manufacturing Engineering). Instead of disagreeing with them regarding the design and development of the vehicle protection bags, the members of *Alpha's* team were asked by **Mike** to persuade the **manufacturing** teams. This implies that the managers of the **manufacturing** units should be considered as the approvers of the vehicle protection bags so that the members of *Alpha's* team should satisfy them and obtain their approval while developing these bags.

This entails that when the suppliers come on board and the team starts to develop the vehicle protection bags, each alteration, testing, verification and validation process implemented on the bags should be accompanied by a formal permission issued from the **manufacturing** units. At the level of the **finance** and **procurement** departments, rigid emphasis was placed on the necessity of getting a **PDL** signed by them prior to making a

new purchase order. A **PDL** is a Programme Direction Letter that can give the recipient of it the financial authority to proceed with their work. At the beginning of *Alpha*, no **PDL** was signed to finance the project, thereby, there were no financial resources allocated for it. The team was therefore asked by their leader (**Mike**), according to the instructions of **the steering group**, to coordinate with the **finance** and **procurement** teams for the sake of issuing **PDLs** for the *Alpha* project. The team was also informed to keep such coordination with the **finance** and **procurement** departments constant rather than transient, as further **PDLs** should come through at every stage of *Alpha*. At the level of **engineering** teams, the only concern that the teams delivered to **Mike** during the first meeting of **the steering group** concerned their lack of knowledgeability about the *Alpha* project and its purposes. As a consequence, *Alpha's* team members were asked by **Mike** to start contacting the **engineering** teams and explain the product that the team is developing to them in order to get access to their facilities and secure the type of assistance the team requires from them.

As a part of the string of meetings held by **the team leader**, the team discussed the potentiality of concluding a contract with a supplier in order to cooperatively develop the vehicle protection bags. A contract was then concluded with an **Italian** company to participate in developing the prototype bag for all of the vehicle lines' cars. The production bag for the vehicle line's cars was designed and produced at **SHAMMA's** first vehicle manufacturing plant in **West Central England**, which were seen as the "flagship models" of the firm at that time. As the team was working on developing a new innovation starting from scratch due to having no accumulated expertise in developing vehicle protection bags, they chose to rely on a new supplier as none of **SHAMMA's**

existing and previous suppliers developed such bags. However, realising in advance that the project might need more suppliers, as new production bags needed to be developed for the other vehicle lines' cars produced at the firm's other plants, they retained a list of alternative suppliers for future use.

Thomas: 'What we really had as a backup was a list of suppliers who could be used in the future. The reason for this was that we were at the initial stage of the project and didn't know how it was going to be, so we thought that it was better to work with a single supplier rather than getting so many suppliers involved.'

4.4.3 Arrival of first supplier

The capabilities of the **Italian** company that was selected to be *Alpha's* first and prime supplier were mainly evaluated by **the team leader**. His assessment of the supplier's capacity, competence and quality was driven by some assertions that were conditioned and made by the senior management of **the Quality Division** within **SHAMMA**. It was crucial for them to get the right supplier. This can be seen through their eagerness to do their own market research on the potential companies that have acquired sufficient expertise in making such protection bags and possess the necessary materials to do so before providing **Mike** with a summary of the key findings of their research. However, the evaluation process of the suppliers was primarily dependent upon **the team leader (Mike)**, who attempted to analyse and understand the capabilities of the potential supplier and decide whether these capabilities were up to the standards of the project or not before making a decision to recruit them for *Alpha*.

Mike adopted three different yardsticks to evaluate the capabilities of the **Italian** supplier prior to making his decision to engage them. The yardsticks that formed the basis of the appraisal process are the cost and the quality of the products supplied and the supplier's

response and capacity. The cost factor was given significant relative weight in the appraisal process owing to the fact that the initial budget allocated for *Alpha* by the senior management of the **Quality Division** (£4 million) was considerable but not sufficient; it was seen as a tight budget and a constraint for *Alpha's* team. This justifies the inclusion of the cost factor in **Mike's** evaluation of the selection of that supplier. The evaluation process was not associated with the cost factor only, it was also associated with the knowledgeability of the chosen supplier and their ability to deliver a quality product and execute the required job according to the standards stipulated by *Alpha's* developers. For instance, one of the parts that were supposed to be protected is the centre console of **SHAMMA** vehicles. It was made up of all wooden shiny brackets and was supposed to be covered during the transit process of the exported vehicles from where they are produced to the port in **Southampton, UK**. The centre console was supposed first to be covered by a 3mm thickness of material (polythene foam). However, the supplier rejected its use when it received **Mike's** bid and became acquainted with the specifications of **SHAMMA** vehicles' parts and instead suggested the use of 3.5mm thickness of that material as the centre console that was supposed to be protected is so thin, and was neither dense nor strong enough.

This suggestion gave **the team leader**, as the principal evaluator of the capabilities of the potential suppliers, an obvious perception of how knowledgeable this supplier was. The capabilities of the **Italian** supplier were also assessed through inquiring about its capacity and ability to respond in a flexible and quick way. The inclusion of such a yardstick in **Mike's** evaluation was driven by the keenness of **the Quality Division's** senior management to ensure that the existing workload of the potential suppliers should not

hamper the project's progress. The **Italian** supplier did not have a great deal of existing workload when **Mike** approached them. As such, they showed an ability and readiness to hand in the required prototype parts on time to *Alpha's* developers and also gave **Mike** required guarantees in respect to responding to the team's orders and requirements during the development of the vehicle protection bags. **Mike's** concern about the work commitment factor while he was evaluating the **Italian** supplier is justified given that *Alpha* project was in need of approximately 100,000 parts per year for one vehicle line's cars; therefore, it was crucial for him to understand how responsive the supplier was and how capable they are of meeting and fulfilling the project's requirements.

Helen: 'The capacity issue is a big problem. In regard to the capacity of our suppliers in particular, we sometimes get assured that they have enough capacity but later on we discover that they do not when they start to implement the project.'

Prior to the arrival of the **Italian** supplier, a prominent role of the **finance** and **procurement** departments emerged in regard to recruiting this supplier. This explains the emphasis placed upon the cost element in **Mike's** evaluation of that supplier. The **procurement** and **finance** departments of **SHAMMA** usually tend to question the selection of a higher cost supplier. Although **the team leader's** decision to recruit the **Italian** supplier was reasonably made and took into account the insufficient nature of *Alpha's* financial resources, they did question his choice and asked him to provide them with some explanations that justified his decision, at which point he managed to get his decision certified by them. The roles of the **finance** and **procurement** teams, however, were not limited to this point; it further extends to involve any future financial transactions pertaining to the **Italian** supplier as they reaffirmed the necessity of obtaining signed **PDLs** before submitting a new order to that supplier.

The **Italian** supplier arrived on **SHAMMA's** premises, in particular its first vehicle manufacturing plant in **West Central England**, for the first time at the beginning of July 2012. The purpose of this visit was to closely scrutinize the exterior surface of **SHAMMA's** first vehicle line cars and then identify the parts that should be included in the protection process. During this visit, the supplier took the required measurements on these cars, examined the suitability of the materials it had suggested were needed to fabricate the protection bags, recorded the necessary notes and codified the minutes of that visit. Given that the supplier's superiority in the design aspect of the development of the vehicle protection bags, which is outside **SHAMMA's** boundaries, these measurements were taken for the sake of designing the prototype version of these bags prior to developing the production version for the first vehicle line. The arrival of some of the **Italian** supplier's materials during that visit was associated with its willingness to understand which specific materials are appropriate for the protection bags. The supplier, however, brought some materials that obviously did not fit with those cars but could only be used to develop similar protection bags for other cars. As a consequence, many materials were released after this examination in order to develop the protection bags in a very robust way. While the notes were retained as a point of reference for any future potential modification of the prototype and production bags' design, the minutes were codified to identify the date and time of the iteration (next amendment) and the name of the *Alpha* member who would accompany the supplier based upon their availability and the prioritised work.

4.4.4 Start of standard development

Many assertions were placed upon developing the standard of the vehicle protection bags,

which is the collective task that was assigned to the members of *Alpha* team by **the body engineering quality manager** during his initial meeting with them. The members, therefore, were keen to harness their efforts in order to start accomplishing this task at the beginning of July 2012. Consequently, they were invited by their **team leader (Mike)** to attend a meeting at **SHAMMA's** principal engineering center in **West Central England** for the purpose of identifying the mechanism in which the standard should be written and then discuss its content and the context in addition to taking into consideration any references that are likely to be utilized while developing it.

Although this meeting helped the team members of *Alpha* to become aware of the standards document in terms of its content and context, they were still not informed enough about its technical characteristics. The *Alpha* members felt that they lacked a precise understanding of how to technically develop a unified standards document for the vehicle protection bags of all of **SHAMMA's** different vehicle line cars in the correct way and based on the right format. Developing one genuine standards document across 12 different cars that are distinguished by their shape, size and weight threw a spanner in the works of the *Alpha* team in understanding the technicality of the standards document and was seen by those members as a major source of this imperfect understanding. The variation of the bonnet from car to car can illustrate this obstacle.

For instance, one of the 12 **SHAMMA** cars that were included in the protection process was a sports car (a supercharged car), which has a unique hole on the bonnet; therefore, the *Alpha* team should devise a method to deal with this hole while protecting the bonnet. As such, the protection bag should be 5 centimetres away from the hole and made up of 20 mm wide tape, which will stick on the bonnet and the glue material should not spoil

the paint. As a consequence, a specific space should be allocated for this in the standards document, stating that the protection bag of this model must have special provision for the bonnet hole. This point and any other points that resulted from the design dissimilarity of the 12 **SHAMMA** cars those were subject to the protection process made the task extremely complex for *Alpha* team as every single part of these cars may entail different types of protection.

There was no proper direction from the senior management of **the Quality Division** in relation to boosting the technical cognition of the members of the *Alpha* team in relation to the process of developing the standard. The **team leader (Mike)** was the only technical guider for the rest of the team and the members were adequately informed in respect of the multi-step process of reviewing, amending and submitting the standard into the respective system. In great detail, **Mike** explained the process based on the instructions of **the body engineering quality manager (Steve)**, who was one of those focal actors engaged in the review and amendment process of the standard afterwards. **The team leader** illustrated this process as follows: first, the process starts each time the members of *Alpha* team develop a new version (draft) of the standard. Second, the version of the standard will directly go to the specialized approvers when it is submitted into the respective system. Third, the approvers will go through the submitted version of the standard, review it, identify the necessary changes that should be considered and inform its developers about these changes. Four, once the standards document is resubmitted by its developers and approved, it will go to the technical specialists where it is subject to further review and evaluation until it obtains the final approval. Starting from the date of the approval, a unique number will be allocated to the approved

standards document and it will be valid for three years, at which point it should then be subject to an updating process.

Prior to informing the members of the *Alpha* team about the multi-strides process of reviewing, amending and submitting the standard of the innovative vehicle protection bags, the team members were not in contact with the technical people and the approvers of such standards. Those approvers and technical specialists were always active within **SHAMMA** and occupied different roles, such as reviewing standards and the quality data of the firm's different innovations and products. However, they were only added to the list of the *Alpha* team's focal relationships at the beginning of July 2012 as a result of the team being prepared to start developing the standard at that time. According to this, the members of the *Alpha* team started to chase them for the purpose of meeting them on a regular basis during July 2012 in order to become partly acquainted with the review criteria, the correction mechanisms and the submission system of the standard.

4.4.5 Start developing protection bags for different vehicle lines' cars

As the **Italian** supplier had made some significant strides in delineating the design of the prototype version of the vehicle protection bags, the *Alpha* team was then in an appropriate position to develop the production versions of these bags for all of the vehicle line cars. Along with the development of the vehicle protection bags' standards, the *Alpha* team commenced the process of developing the production versions of the protection bags for the first vehicle line cars during the first week of July 2012 at the vehicle manufacturing plant in **West Central England**. During this period, the three automotive project engineers of *Alpha*, the **Italian** supplier and some of the workforce of the plant that hosts the development of the protection bags were all supervised by

Alpha's team leader (**Mike**) to collectively give all types of input into making these protection bags. A week later, the team started to develop other production versions of the protection bags for the vehicle line cars that are produced at the firm's vehicle manufacturing plants in **West Central** and **North West England**. As a consequence of this, each of **Alpha's** automotive project engineers was moved to a different vehicle manufacturing plant for the sake of developing different vehicle protection bags for different vehicle line cars. A new work schedule was circulated to **Alpha's** three automotive project engineers as a result of the partial change that occurred in their individual roles. **Thomas** was partially moved to **SHAMMA's** vehicle manufacturing plant in **North West England** to design production versions of the protection bags for the specific vehicles produced there. **David** was partially moved to the second vehicle manufacturing plant in **West Central England** to design production versions of the protection bags for the specific vehicles produced there. Finally, **Tim** was kept at the firm's first vehicle manufacturing plant in **West Central England** to continue developing the production versions of the protection bags for the firm's flagship vehicles produced there. This new job distribution, however, did not prevent the team members and their leader from gathering at the firm's principal engineering centre in **West Central England** where they discussed the development of the vehicle protection bags' standards during their fieldwork.

As the new job distribution circulated to *Alpha* members entailed changes in their workplace, some obstacles surfaced as a result of the members performing their fieldwork in new and unfamiliar manufacturing sites. A major hindrance experienced by the two members of *Alpha* (**Thomas** and **David**) who were moved to such manufacturing

sites was the lack of subordinates' knowledgeability at these manufacturing plants about the *Alpha* project. During *Alpha* members first and the second visits to these plants, it was obvious that those manufacturing subordinates were not properly informed about the role of the vehicle protection team and the value it adds to the aggregate quality of **SHAMMA's** vehicles, as they were questioning the task assigned to *Alpha* members. As the number of the subordinates at these manufacturing plants was quite large, it was inevitable that *Alpha* members would have to put a great deal of effort into proving their authority to any subordinate who was working with them and explain the duty assigned and its purposes. Although nobody was there to assist *Alpha* members in that regard during their initial visits to the new vehicle manufacturing plants, the members managed to gradually enhance the perception of their subordinates at these plants in relation to the type of work assigned to them and the entire process of vehicle protection.

During the subsequent visits to the firm's vehicle manufacturing plants in **West Central** and **North West England**, the members of *Alpha* became more authorized and their position in the context of those who work at these plants became more powerful. This stemmed from some bilateral contact conducted between **the team leader** of *Alpha* and the managers of these two new plants (**the managers of the plants vehicle teams**). This eased the access path of *Alpha* members into the plants and allowed them to discuss a mechanism that facilitated the authorisation of those members while working at the plants. As a consequence of such contacts, **the managers of the plants' vehicle teams** and **the *Alpha* team leader** were convinced by the necessity of providing each member of the team with formal authoritative permission. The aim was to show their power to subordinates so that they can promptly respond to commands; ultimately, their

engagement in the development of the vehicle protection bags can then be facilitated. This formal mandate is called a “Line Pull Document” and is issued to explain the nature of the task, clarify the motives behind implementing it and identifying the time frame of the task and the vehicles that will be involved.

Developing vehicle protection bags at three different vehicle manufacturing plants, which are characterized by a decentralised and autonomous type of management, was a source of some constraints for *Alpha* members. This was attributable to the fact that each plant is controlled by a certain group of **the plant vehicle teams’ managers** and those managers were usually tending to advance their own interests at the expense of the collective interest of **SHAMMA**. They were only concerned with the protection of the vehicles produced at their respective plant and showed some indications that point to their unwillingness to cooperate in enhancing the protection levels of the entire fleet of **SHAMMA** vehicles. While working at their respective plants, *Alpha* members in many cases discovered that, although the development of the vehicle protection bags was in the best interest of the plants vehicle teams’ managers, for the purpose of protecting their vehicles, each of them directed that interest into a specific direction so that it could be limited to his tenure with **SHAMMA** and his plant’s own vehicles. An example of an incident in which those managers demonstrated the tendency to place minimal assertions beyond their horizons occurred when the *Alpha* member who was working at the firm’s vehicle manufacturing plant in **North West England** successfully launched a sort of protection for the technology plate of the vehicles produced there. However, he then failed to bring this specific protection across all of the plants owing to the lower levels of interest shown by the vehicle team managers at his plant to cooperate on such an aspect.

4.4.6 Second and third suppliers' arrival

Prior to the recruitment of the second and third suppliers, **Mike** pursued the same path he had previously followed when recruiting the **Italian** supplier and readopted the same three yardsticks in assessing the capabilities of these two suppliers. He reckoned on the quality criterion in his assessment to ensure that the design capabilities of these two suppliers can be fully consistent with the production versions' design of the vehicle protection bags for the vehicle line cars produced outside the firm's first vehicle manufacturing plant in **West Central England** in all dimensions such as thickness, density and appropriateness of materials. He included the cost factor in that evaluation to ensure that the recruitment of the new suppliers does not entail any breaking of the £4 million budget initially set by **the Quality Division** of **SHAMMA** for the *Alpha* project. The inclusion of the suppliers' capacity and response factor was justified by the willingness of **the team leader** and his team to recognize how much production flexibility the new suppliers have prior to bringing them into *Alpha* project. Unlike their engagement in the recruitment of the first supplier, *Alpha's* three automotive project engineers had an apparent role in recruiting the second and third suppliers as a result of enhancing their knowledgeability about the technicality of the vehicle protection bags development and, thereby, increasing the confidence of *Alpha's team leader* in their evaluation capabilities so that they can be delegated to pursue new suppliers. They were initially accountable for preparing the listings of the potential suppliers and categorizing them according to the three criteria identified by their **team leader**. Their role was then extended to involve the chase of those suppliers who are fully or to a great extent compliant with the stipulations imposed by *Alpha's* management. They then started to evaluate the quotes sent from those suppliers prior to submitting the necessary bids to

them. Such evaluation and negotiation process ultimately resulted in adding two British suppliers to the existing **Italian** one.

The two national suppliers synchronously arrived at the firm's plants in **West Central** and **North West England** at the beginning of the fourth quarter of 2012. Similarly to the purpose of the **Italian** supplier's first visit, the first visit paid by these new suppliers was driven by taking advantage of the in-progress prototype version of the vehicle protection bags and taking the necessary design measurements on account of developing the production versions of these bags for the cars produced at their respective plants. The two suppliers specifically took into account the elements of immovability and curvature while taking such measurements. A group of detailed and various notes was taken by the representatives of the suppliers during this visit, a part of which pertained to the identification of the type of materials that fits with the exterior surface of the cars produced at these two particular plants while the other part was associated with highlighting some of the potential actions and modifications for the forthcoming iteration. In a similar way to sealing each visit of the **Italian** supplier to the firm's respective plant, the initial visit of the new suppliers was concluded through approving the minutes where the representatives of the different parties (the two suppliers and the *Alpha* team) simultaneously reached an agreement in relation to identifying the date and time of the iteration (next amendment) and the names of the *Alpha's* members who would accompany the suppliers in that iteration. However, unlike what was happening with the visits of the **Italian** supplier, the factors of availability and prioritised work neglected to identify the member of the team who would accompany the new suppliers in their next visit to the firm's plants. Instead, each specific member was asked to manage their

relationship with a specific supplier and escort them to the plant he was allocated earlier in each forthcoming visit. This ultimately led to converting the individual role of each member from a constrained and narrower role into a wider one.

4.4.7 Overlap of tasks

This specific period of *Alpha's* life (middle to end of September 2012) was characterized by the plurality of the interlaced tasks, which impacted upon this project practitioners' perception of their own roles and also substantially influenced the progress of the project. During this phase, the members of *Alpha* were introduced to and informed about the linkage between their own project and the overall **GPDC** (Global Product Development Cycle). The **GPDC** of **SHAMMA** is made up of 36 months of lead-time in which the firm implements a networked development process that is entirely managed by a digital product development system. This cycle covers the time in which the senior management of the firm gives a green signal to start producing a specific car until its delivery to the respective dealer. The *Alpha* project is not completely dependent on the **GPDC**; it however inevitably intersects with that cycle at the three latter stages. *Alpha* members were informed about the intersection so they could develop a prior understanding of their engagement in the **GPDC** and recognise the launch date of each car, subject to the protection processes implemented.

The **GPDC** starts when the senior management of the firm gives a green light regarding the build of a new model or the rebuild of an existing one. The end of such an initial stage of the **GPDC** is conditioned by receiving the necessary directions issued from the senior management and is required then to proceed with the car subject to the development/redevelopment by the middle management levels of the firm. The second

stage of the cycle is represented by converting the directions of the senior management into a specific concept and computing every notion pertaining to the design of the car subject to its development/redevelopment through the firm's digital product development system. The actual development of the car starts in the **VP** (Vehicle Prototype) stage. During this stage, the firm produces very few prototype cars (only four to five), as they need to see how the car looks. Despite the availability of such prototype cars, the *Alpha* team is not permitted to work on these cars, as there are usually thousands of small and mini parts that cannot be loaded inside the cars during this specific stage. The team starts to see the actual physical cars that are subject to the protection process in the **TT** (Tooling Trials) stage.

During this stage, the **manufacturing** teams of the firm's three vehicle manufacturing plants produces scores of complete cars (30 to 40) for testing purposes and the *Alpha* team is asked to stay in touch with them in order to understand the position of the testing process of the vehicle protection bags within the assembly line sequence adopted by **SHAMMA**. The task assigned to the members of *Alpha* team in cooperation with their suppliers during this stage is to collectively test the quality of the vehicle protection bags. This is accomplished through exposing the complete cars that are coated by the protection bags to diverse driving conditions in order to check the robustness of the bags and their impact on the exterior surface of the cars in terms of scratches and deformations. The paint teams are therefore contacted by the *Alpha* team to investigate the impact that the materials of the vehicle protection bags have on the paint of each tested car. Besides the complexity of the technical aspect of such testing processes, new strict confidentiality legislation is applied to *Alpha* members and their suppliers while

engaging in these processes, such as the sanctity of taking photographs of the cars they work on as these cars are still under development and have not been publicly launched. The engagement of the *Alpha* team in the **GPDC** of **SHAMMA** continues to involve the subsequent stage of the **TT** stage, which is the **PP** (Pilot Production) stage. In the **PP** stage, the firm starts to build the actual number of its different car models that will be launched into its 179 markets across the globe. During this stage, the members of the *Alpha* team repeat the examination process that they have implemented on the vehicle protection bags during the **TT** stage with the assistance of their suppliers. However, the number of vehicle protection bags that are subject to the quality tests during this stage is much larger in comparison with the previous stage, as these bags will be ultimately allocated to thousands of tradable cars. During this stage, the *Alpha* team is also required to contact the **MPL** teams (the Material Planning and Logistics teams), as they coordinate with the transport suppliers that are responsible for delivering the ready-to-export cars with vehicle protection bags on them to the port of exit.

Those teams usually undertake a special trial for the bags, as they have exclusive know-how in relation to distance measurements, load and shipment issues. The ultimate interaction of *Alpha* team members with the **GPDC** of their firm occurs in the last stage, which is the **MP** (Mass Production) stage. During this stage, the firm finalises the process of car production that began in the **PP** stage, which implies that the team members of *Alpha* should witness the final installation of the vehicle protection bags on **SHAMMA's** different car models for supervision purposes. The role of the team during this stage extends to encompass tracking the relocation process of the cars coated by the protection bags from where they are assembled to where they are received by the respective dealer,

as each dealer is expected to check its cars prior to confirming their status. Below is a summary of the different stages of the **GPDC** of **SHAMMA** and their linkage with the *Alpha* project.

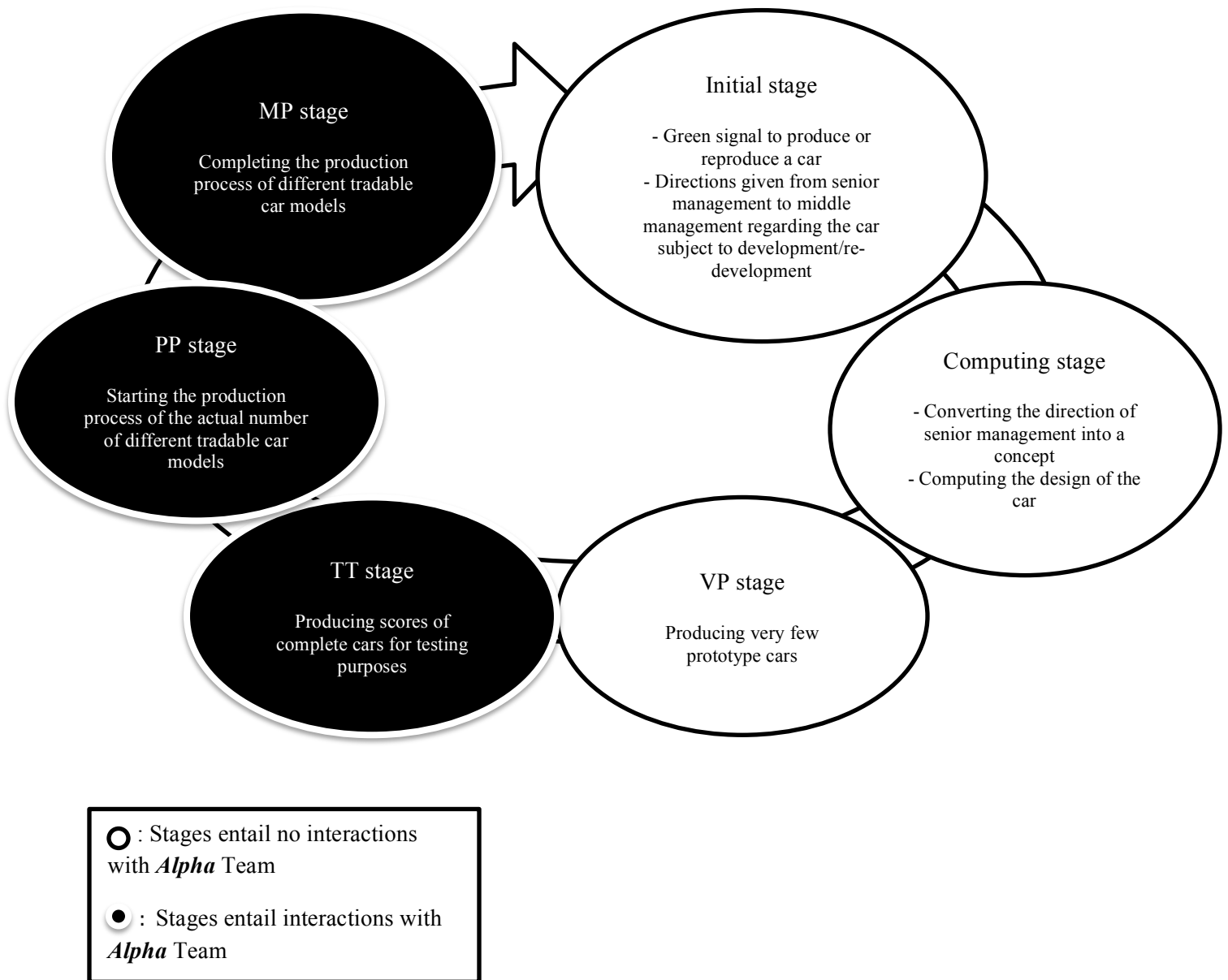


Figure 3: Stages of Global Product Development Cycle of **SHAMMA**

Within the same time frame of perceiving the intersections of their project with the entire GPDC of SHAMMA, *Alpha* members encountered a further mental battle as they started to delve into the deeper levels of the development process of the vehicle protection bags' standards. At this specific point of time, and as direct developers of the standard, the *Alpha* team members substituted their initial understanding of the development process of the standards with a mature one owing to the fact that they experienced incremental technical difficulties while progressing the development process of the standards that were not in their initial perception of the process. Such difficulties derived from the high level of information quality required for developing a standards document with high-volume data at project level and the quandary of writing a structured and unified content of one standards document for vehicle protection bags of 12 different vehicle cars that are distinct in terms of size, shape, design and characteristics.

Thomas: 'Our job started to grow in number and nature when we realised how much time and effort we need to write the standards, which we did not fully recognise at the beginning, as I told you before. We thought it was an easy task to do, however, two months later, our perception of the standards completely changed. It was also when we started to work with three suppliers. That's was at the end of 2012, end of September I believe.'

During this time, *Alpha* members were being pushed to accelerate the pace of their progress with the development of the vehicle protection bags' standards. This pressure raised some concerns among them as the excessive rush may ultimately expose them to the hazard of falling into non-compliance with the norms endorsed by **the Quality Division**, which govern the process of developing standards for its distinctive projects through writing outdated and imperfect data or/and adopting inappropriate formats for the standards. This was specifically attributable to two motives. First, the conversion of the

design, technical specifications, materials and environmental rules of the vehicle protection bags into a systematic code entails writing a great deal of pages that are stuffed with hundreds of diagrams, schemes and links as well as a bibliography. Second, the necessity of developing a consolidated standards document requires escalated efforts to make its developers able to integrate thousands of content fragments with each other regardless of the degree of granularity while developing it.

In order to diminish the shortcomings of the standards to the minimum, the developers were instructed to review and scrutinize the existing similar quality standards that were previously developed for other innovations/projects. These are the sets of data that have already been mentioned and approved by a number of approvers and specialists each time they were inserted into the relevant system within the firm. Such sets of data were brought to the firm's principal engineering center in **West Central England** where the *Alpha* team members were progressing the development of the standards via a separate group of people who work on the firm's quality documents. This specific group takes responsibility for monitoring the processes of standards development of the firm's different innovations/projects and supplying those who are accountable for them with the relevant supporting data. The sets of data received by the *Alpha* team thereafter underwent an appraisal process in which the team members personally extracted the design and ecological rules that were set forth in these sets of data and can be employed in their own standards. Despite the explicit willingness of the personnel who cope with the existing quality standards within **the vehicle quality team** to give their input in the process of utilising such standards through sharing their knowledge in dealing with them and/or re-using them, *Alpha* members endured some dilemmas while dealing with few of

these standards. The fundamental obstacle was represented in that there were some sets of data that could not be readily used by the team because of technical issues. Such data should be re-codified in a way that makes them consistent with the standards of the vehicle protection bags. To do so, the *Alpha* team exerted great efforts and spent some time entirely reformulating and updating other elements of these standards prior to employing them in their own, as access to the people who actually created them was not facilitated owing to SHAMMA's large size, which hinders access and employee turnover.

Thomas: 'As a member of a team, yes, there are so many things that I can make better. The most important issue is that, although there was a separate group of people who worked on the quality documents within the vehicle quality team, this group was just storing these sets of data, dealing with them and providing us with copies of the relevant set; it did not create them. We did not have contact with the actual people who created them. So, when we looked at some quite out-dated quality standards, we wanted to contact the people who created them in order to update them, but we could not, as some of them had left the company and others had moved to different roles. I remember, for example, we had time to write an email to one guy who had created an existing standards document. We wanted to update that document before using it but we could not reach the guy, he was not there. So, my suggestion is that there should be a proper check; the vehicle quality team should look at a way to enable updates of these sets of data annually instead of just storing them and leaving them as out-dated and invalid.'

While dealing with the existing quality data, the *Alpha* team members were also directed to review other institutional resources. As a consequence, two different categories of existing materials data were taken into account: the materials data sheets and their technical specifications. The materials data sheets were seen as the cornerstones of the development of the standards for the vehicle protection bags. Such formal sheets comprise detailed data on the materials used in producing the protection bags and their characteristics, then define the producer of the materials and explain their hazardous

ingredients. It was indispensable for *Alpha* members to refer to these materials sheets in order to comply with the required rules identified by **the Quality Division** for defining the materials used in any product development process that takes place within the division. Such sheets were used to define the ingredients of a certain material, how this material should behave, and what should be its physical, mechanical and thermal properties. For example, when a company has the intention to use any plastic materials while developing the protection bags, the developers of this product's standard must allocate a line stating that this plastic should be environmentally friendly, biodegradable plastic and disposed of in a certain way, as explained in a specific former standard. Then, they must pull the number of the former standards document and put it in their own standard as a reference point. So, instead of defining all the materials and their ingredients and properties from scratch, the *Alpha* team relied on the materials data sheets to pull the available relevant data they need when developing their own standard.

In contrast, the *Alpha* team used the materials technical specifications sheets as they detail the requirements for each material that is expected to be utilised in developing the vehicle protection bags. These sheets compare the different options of materials, highlight the advantages and disadvantages of using them and classify them according to their appropriateness to the design and durability of the vehicle protection bags. The judgment regarding selecting the appropriate materials was in the first place attributable to the *Alpha* team. However, an apparent role of the suppliers in this judgment was observed, as during their initial visits to the respective vehicle manufacturing plants at the beginning of both July and September 2012 they all suggested specific different materials that can fit with the exterior surface of the cars of the three vehicle lines that each of them

was asked to develop protection bags for. This judgement was not easily made, however, as the development of the protection bags for these distinct vehicle lines entailed the use of different types of materials: breathable and non-breathable. The former type was specifically used for the horizontal places of the vehicle under protection for the sake of preventing water from getting inside it and the latter type was used for the vertical places. Ultimately, seven to eight breathable and non-breathable materials were initially selected as an outcome of this judgment.

The judgment made on the appropriateness of the materials in relation to the design of the vehicle protection bags resulted in changing some of the rules that were initially set for making the consumption policy that identifies the amount of the manufacturing resources such as plastic, aluminium and rubber that should be consumed in the *Alpha* project. This added a new task to the “basket” of *Alpha* team’s members as they consequently reckoned on their acquired knowledge and available know-how to make the required modifications. Although the replacement of the existing consumption rules with new ones had an effect, the team members managed to keep it to a minimum as they capitalised on their available knowledge to estimate the negatives associated with this replacement. The newly selected materials were subject to a set of consumption criteria so will only be sourced and used if they are able to attain a compliance with the amended consumption policy of the project. *Alpha* members were also keen to subject the newly selected materials to a technical examination for the sake of practically understanding how proportionate they are in relation to the strength, durability and pliability of the vehicle protection bags. To do so, both the *Alpha* team and its suppliers referred to the quantitative measurements taken during the suppliers’ initial visits to the vehicle

manufacturing plants (at the beginning of both July and September 2012) and examined if the recently suggested materials can be consistent with the degree of strength, durability and pliability identified in these measurements. As the results of the technical examination showed proportionality between the materials and the three technical criteria, the team also had a closer look at the financial considerations of using the new materials in order to make certain that the purchase of such materials does not entail receiving rejected **PDLs** from **SHAMMA's finance** and **procurement** departments.

By the end of this stage of the project (middle to end of September 2012), a quantum leap had occurred in the mentality of *Alpha* team's members. Being well-informed about the intersection of the project with the **GPDC** of **SHAMMA**, the reduction of transaction costs that emerged from capitalising on the existing quality and materials data and the required modifications that accompany the amendment of the consumption policy of *Alpha* helped the team's members to convert their confused state of mind into a more unclouded one as the vagueness associated with understanding the overlapped tasks of this specific stage became meagre.

Thomas: 'When we started working on this, we didn't know exactly what we were doing, we didn't know the way forwards - I can put it as so – we didn't know how to go forward, or in the right direction. So our mind-set was like "Oh, it's so difficult" and as the project kept going on, and when we were in the mid-stage of it, then we started realising, "Oh, it's not that hard" because the only thing we have to do is the right things at the right stages, which makes our workload less.'

4.4.8 Recyclability restriction

In the midst of reviewing **SHAMMA's** existing quality and materials data, the *Alpha* team members became more acquainted with the determinants and elements of their firm's environmental regulations and the necessity to comply with them. Such deep

acquaintance made them reconsider their materials options, as they had not been previously informed about these regulations at length. Although a commitment towards the environment has already been engraved on the minds of *Alpha* members since the project' commencement, they perceived during July and August that their time in the project was just a loose concept rather than a recipe to guide their interaction with the environment. It was not initially comprehended as a well-defined rule or norm, it was more considered as a part of the firm's ethics and principles to promote a type of manufacturing activities with less negative ornamental (environmental) effect. The existing quality and materials data reviewed by the team members helped them then to understand their roles towards the environment concretely. As such, the existence of a system specifically developed by **SHAMMA** to manage environmental effects in an effective way during the implantation of any manufacturing project that takes place within it was revealed.

This environment management system was launched for the first time in 2009 and copes with the environmental impacts of the firm's manufacturing activities as a business priority by identifying their yearly goals of reducing the negative environmental impacts in which these goals are set forth in **SHAMMA's** balanced scorecard and is directly tied to each individual's activity within the firm. This system had initially been an obstacle for the *Alpha* team as one of its fundamentals is an emphasis on producing products that should be made of less non-recyclable materials, which resulted in the team's options of which materials to use being reduced. The team first examined the option of being open to using infinite non-recyclable materials with the notion of sending them back to the suppliers who supply them as a method of disposing of them but this option did not prove

its feasibility as it entails large financial resources that cannot be covered by the budget of the project. The team thereby turned toward an option that relies on using the two types of materials (recyclable and non-recyclable) but to varying degrees, so that the recyclable materials, which are more costly, take the largest share of the product and the non-recyclable materials, which are less expensive, take the remaining share. The team, as a result, decided to waive some materials that had already proven their suitability for the vehicle protection bags for reasons pertaining to either the inability or expense of reusing them and also to not exceed the percentage that their firm identifies when using landfill materials. This restriction forced the team to consider seven or eight breathable and non-breathable materials for making the vehicle protection bags.

4.4.9 “Show car” event

While working separately with the respective suppliers on developing protection bags for the cars of three different vehicle lines, the *Alpha* members regrouped and built on the existing state of the protection bags development of the first vehicle line’s cars for the purpose of completing preliminary versions of the protection bags for that line’s cars. This step was considered as a prelude to their commitment to participate in a “show car” event held at a display hall within the firm’s premises in **West Central England** with the objective of displaying the preliminary protection bags to the senior management. The event was held at the end of October 2012 in the presence of three directors and seven to eight senior managers who were representatives from the **current manufacturing engineering** unit, the **advanced manufacturing engineering** unit, the **plants’ managers** and the **engineering** teams, with *Alpha* members considered as the lowest level personnel at the event. During this event, *Alpha* members were asked to put the entire set

of the protection items (the seat protection, the console protection, the steering wheel protection and the whole protection bag) on the displayed cars and show them to the senior management for the sake of giving them the opportunity to closely assess the design and functionality of the preliminary protection bags. As these bags were assessed by a cross-functional senior team, diverse and conflicting standpoints were raised during the assessment process of the bags. The conflict was that every director or senior manager seeks the interest of his own unit to maximise his own unit's benefits from the protection bags. The demands of the **current manufacturing engineering** managers were more directed towards doubling the protection level of the bags without taking into account any financial or time considerations. This keenness to have more protection is understood as an attempt to ensure that the vehicle protection bags can eventually reduce the numbers of complaints they usually receive to the lowest possible level. These demands, however, collide with the interests of the **engineering** teams, as their representatives expressed their unwillingness to implement further considerable design alterations. This unwillingness can be attributed to the fact that the development of the vehicle protection bags is not one of their core businesses, thereby, they do not want to harness further resources to it, and they do not want further operators to be unhappy or disgruntled as they work on something that is not their own.

The conflict emerged from the senior management's assessment of how the preliminary protection bags were handled by the *Alpha* team, specifically, **the body engineering quality manager (Steve)**, by concentrating on two aspects. First, by balancing between the willingness of the **manufacturing** teams, in particular the **current manufacturing engineering** managers, to considerably amend the protection bags and the inclination of

the **engineering** teams to not allocate further resources for the amendment of the bags by adopting incremental design amendments instead of radical ones. An example of these amendments is to increase the strength of the protection bags so that they sit robustly on the bonnet of the cars subject to protection through using proper strong hooks and putting a strip below the bonnet, which runs across so that it holds at each end and pulls it properly. Second, resorting to the standard in settling the dissensions that occur among the senior assessors of the protection bags about the proposed amendments. The purpose of this was to some extent naturalize all of the assessors of the vehicle protection bags and identify the compliance with the standard as the fundamental criterion in relation to amending the design or/and the materials of the bags so that the standard acts as a template or a guidance for the assessor as well as the developers of these bags.

4.4.10 Final amendments and submission of the standard

The conflict occurred between the members of **SHAMMA**'s senior management as a result of their assessment of the preliminary versions of the vehicle protection bags during the "show car" event held at the end of October 2012. The decision made by **the body engineering quality manager (Steve)** to resort to the standard as an antecedent of resolving such a conflict made *Alpha* members more aware of the necessity of accelerating the development and accreditation of that standard. This was followed by an evident order made by Steve to the rest of the team to slow down the pace by which they were developing the vehicle protection bags at the expense of hastening the development of the standard for the sake of getting it approved in the near future. To achieve this, the team members referred to "**SDOT**", which is the system adopted by **SHAMMA** to evaluate and approve the standards of its different innovations/products in order to review

the current status of their own standards at that time and then meet the relevant reviewers and approvers and seek further explanations prior to starting the amendment process under the supervision of their **body engineering quality manager**. As a consequence of these explanatory meetings, *Alpha* members identified some amendments for final review prior to entering them into force.

These amendments are divided into two types; amendments associated with the format and the language of the standard, and those associated with the design rules of the vehicle protection bags. The team spared no great effort in making the alterations associated with the former type as they were taking the form of matching the format of their own standard with the type of format adopted by their firm, adding the diagrams and graphs required to illustrate the more detailed parts of the content of the standards and proofreading its entire contents. In contrast, a great deal of effort was exerted by the team to implement the alterations pertaining to the latter type as they were related to the core of their project. Most of these alterations were embodied in discovering solutions for the design constraints highlighted by the assessors during the previous “show car” event, in particular within the areas of the functionality (e.g. controlling the thickness of a material used to protect a specific part of a certain vehicle) and manufacturability of the protection bags (re-identifying the degree of curvature of a bag specifically developed for a certain vehicle) and then adding them to the standards. Given that **the body engineering quality manager** was originally one of the approvers appointed by **SHAMMA** to accredit the standards of its products, he reviewed all of these final amendments of the design rules before they were inserted into the **SDOT** system. This contributed to reducing the feedback loop and the timeframe required to review the final amendments, as it gave the

developers of the standard the opportunity to validate these amendments without the need to wait until a formal review meeting was held. Following the validation of the final amendments by **Steve**, the team submitted the final draft of their standard into the relevant system (**SDOT**) at the end of November 2012 and then managed to obtain the related approval two weeks later.

4.4.11 Completing the protection bags for the first vehicle line's cars

The submission and accreditation of the standards removed some of the burden from the shoulders of the *Alpha* team as it allowed a greater space to move towards completing the development of the vehicle protection bags. To do so, the team's concentration was distributed into two parts in parallel. First: the team members were directed to collectively prioritize the development of the protection bags allocated for the first vehicle line's cars, as they were the "flagship models" of the company at that time and the launch date of some of them was fast approaching. Second, the two automotive project engineers who were previously assigned to work on the protection bags for the other vehicle lines' cars at the firm's manufacturing plants in **West Central** and **North West England** received an order created by **Mike**. He allocated the remaining part of their working time to the continuance of the development process of the protection bags for these specific cars in cooperation with the relevant suppliers.

In their pursuit of finalizing the development of the protection bags for the firm's flagship cars, the team executed a final examination to measure the perfection of these bags by relying on design systems and conducting internal and external related tests. First, they were introduced to a software called "ByteWorx" in order to use it for the creation of **FMEA** (Failure Mode and Effects Analysis), which is a design errors detection system.

ByteWorx acts as an operating system of **FMEA** as it has a range of reports and analyses that facilitate the utmost use of the analysis. It also provides the team with a complete range of visual and reporting instruments that aid them in conducting the risk assessments needed while they are using **FMEA**. Second, following the introduction of ByteWorx to the team members, they were then at length informed about **FMEA** with the aim of enhancing their knowledgeability level of the system prior to using it. The system was then used to detect the errors of the protection bags' design, understand the effect and function of these detected errors, perceive how easily these errors can be detected, identify the occurrence rate of the errors and then comprehend the mechanism within which these errors can be fixed. All of these **FMEA** activities were executed for the purpose of enhancing the quality and reliability of the protection bags before installing them on the respective cars. Data was gathered to avoid any prospective failure in respect to the development of the protection bags, as engineering learning was accumulated, and above all this ensured the attainment of the aim of the *Alpha* project. This was to reduce the warranty claims that stemmed from the exposure of **SHAMMA**'s cars to any type of damage during their transfer to the company's dealers worldwide. For both systems (ByteWorx and **FMEA**), **the vehicle quality team** had an influential role in reducing the complexity of using them, especially **FMEA**, as they allocated two training sessions for *Alpha* members to help them practically pilot the systems before they started to officially use them. These sessions did not take a formal structure, however; they were more like a type of guidance.

In parallel with detecting and handling the design errors through the **FMEA** system, the *Alpha* team conducted two final tests to check the immobility and durability of the

protection bags. The first test was externally conducted in cooperation with **MTIA**, which is a vehicle engineering consulting firm that has a permanent partnership with **SHAMMA** and is renowned for its world-class testing solutions. Based on this partnership, *Alpha's team leader* team (**Mike**) contacted **MTIA** for the purpose of booking a slot for testing the protection bags. Consequently, specific models of **SHAMMA's** cars were coated in samples of the protection bags and then relocated to the premises of **MTIA** in order to subject them to a wind tunnel test. The objective of conducting such a test was to examine the immobility of the protection bags in a set of different wind speeds through exposing them to diverse climatic conditions. The samples of the bags were first tested according to the **UK** speed standards, which is 70 miles per hour, whereby the air was pumped into the wind tunnel while the cars coated by the bags were moving at that speed in order to assess the effect of the air on the bags. The samples of the protection bags were then tested under the realistic climatic conditions of cold countries such **Ukraine**, where temperatures can reach minus 35 degrees. The samples were also tested under the realistic climatic conditions of countries with high temperatures like the **GCC** countries, in order to understand how the bags interact with and resist dust particles and heat. The external immobility test (the wind tunnel test) was then supplemented by an internal one called a strip test that was specifically conducted for the sake of examining the durability of the protection bags. This test was mainly conducted to perceive the impact of multiple factors/loadings such as humidity, water and thermal and solar radiation on the durability of the protection bags. As this test was conducted in-house, it took the *Alpha* and **vehicle quality teams** some time to prepare the place of the test for it. This was attributable to the fact that the allocated facility for

the test was not equipped enough with the resources needed for implementing such a test, like a system that monitors the interactions between the bags and the loading options as well as the required amount of solar radiation.

In a final step before submitting the protection bags to the respective **plant managers**, the members of the *Alpha* team displayed samples to members of SHAMMA's senior management during a **steering group** meeting held for this purpose. **The steering group's** members expressed their satisfaction with the displayed samples of the bags; they however identified some room for improvement. As a result, a set of minor amendments was implemented in a few areas by the *Alpha* team in cooperation with the **Italian** supplier. Two weeks later, during February 2013 in particular, a large number of complete vehicle protection bags were sent to SHAMMA's first vehicle manufacturing plant in **West Central England** in preparation for installing them on the firm's flagship models (the firm's first vehicle line's cars).

4.4.12 Turnover of *Alpha* members

Completing the development of the protection bags enticed the senior management of SHAMMA, represented by **the Quality Division**, to start dismantling the *Alpha* project in a phased manner as a prelude to handing it over to the respective **COCs** (Centres of Competence) within the **Body Engineering Division**. As a consequence of this, a decision was made by **the body engineering quality manager (Steve)** at the end of February 2013 to relocate one of the project's automotive engineers to a new and different role within the **PRT** (Plant Recall Team). The team did not feel pressure following the departure of this member as it did not concretely influence the progress of the project since the development of the protection bags designed for the second and third

vehicle lines' cars work was in good shape and almost approaching its end point. This was not the case, however, when **Steve** made a decision at the beginning of May 2013 to move another **Alpha** automotive engineer to a new position within a different project. The project's activities became a burden for the three team members remaining, including **the team leader**. Both decisions, to abandon two of the *Alpha* members, were not a part of the rotation policy adopted by **SHAMMA**. This was in fact an attempt to reduce the financial resources spent on the project after its basic budget (£4 million) was forcibly increased to £5 million following the approval of the firm's senior management to extend the project as it had exceeded the timeframe previously identified for it (February-April 2013).

Witnessing the *Alpha* team being unable to cope with the effects of the departure of two members, the senior managers of **the Quality Division** quickly contradicted their decisions pertaining to reducing the number of automotive engineers working in the project by half and appointed two new alternative automotive engineers, one with a permanent role (until the termination of the project) and the other with a temporary one. **The body engineering quality manager (Steve)** made this decision in the middle of June 2013 during a meeting at the firm's principal engineering centre in **West Central England** and the new entrants started their employment a week later. During the first week of their employment, the new team members were escorted by **Steve** and **Mike (the team leader)** to the firm's manufacturing plants in **West Central England** with the objective of enhancing their perception of their new roles in a practical way. During this visit, they showed them the way in which the team develops the protection bags and offered detailed information on the requirements of developing the bags, the current

suppliers of the project, and most importantly the purpose of developing such bags. Despite the explanations given to the newcomers during their induction visit to the manufacturing plants, the roles assigned to them were perceived as a challenge. This stemmed from the fact that they both spent approximately 45 days to realise their roles within the project and pick up their working speed to the level of the ex-colleagues.

4.4.13 Termination and handing over of *Alpha*

As an outcome of **the body engineering quality manager's** inclination to gradually move the members of *Alpha* team, including the team leader, to new roles, specifically within **the plant recall team, the Quality Division** geared up to take all of the necessary steps to terminate the project and then send its components to the related parties within the **Body Engineering Division**. These steps started by reducing the involvement of the three suppliers in the development activities of the protection bags, as **SHAMMA's** respective developers became fully conversant with the technicality of the bags. **The Quality Division's** decision to dissolve the entire *Alpha* team also paved the way for the division to hand over the project to the **Body Engineering Division**. Consequently, and based on the recommendation of **the body engineering quality manager** and the approval of **the quality engineering director**, a decision was then made at the end of 2014 to hand over the project activities to the receptive **COCs** of the **Body Engineering Division**.

Thomas: 'I think it was the quality engineering director, because he was the one who was driving this. I think he was the most senior person at the management level guiding this but I don't think there was anyone driving the termination of the project, or anything like that. So I think, yeah, to be honest, if I can say there's one person I think it might be the quality engineering director who had the authority to do it. Or he had to hold up the project for some time because of the financial constraints, but it was planned in such a way that there was no chance of these things happening.'

The **COCs** (Centres of Competence) are specialised engineering facilities that were designed to develop certain components/parts of **SHAMMA's** entire vehicle lines. These facilities are characterised by three attributes: experts with deep know-how in the domain of engineering, practical engineering knowledge and lasting institutional capabilities that can sponsor existing innovation or technology projects. Given such defining attributes, each **COC** received a formal request from **the Quality Division** to take responsibility for developing the protection element(s) of the bag that are associated with the part/component it originally developed. As *Alpha* was initiated with the intention of coating all of **SHAMMA's** cars with the protection bags regardless of where they are manufactured, the project's activities were handed over to the **COCs** of the **Body Engineering Division** within the firm's three manufacturing plants. For instance, the **COCs** (seven to eight engineers for each **COC**) that develop the bonnets of the cars produced at the firm's first manufacturing plant in **West Central England** were asked to be accountable for providing the protection elements of the bags that specifically pertain to the bonnets of the vehicles produced at that specific plant. In addition, the **COCs** responsible for developing the bumpers of the cars manufactured at the firm's manufacturing plant in **North West England** were asked to be accountable for providing the protection elements of the bags that are specifically related to the bumpers of the cars manufactured at that plant only.

Although **the Quality Division** already had the standards and processes of *Alpha* in place, handing over the project to the respective **COCs** was expected to entail some negative consequences. On the top of that, there was an expected and noticeable delay in carrying out the development activities of the protection bags within each **COC** for the

first couple of months of the handing over. This was because it took some time for the new engineers to arrive and start looking into the development process of the bags. Despite this, the quality of the project was not affected in a big way.

Steve: ‘As I’m responsible for the engineering process of this product, I could argue that if we’ve engineered the product correctly then somebody else always has to fit it that is just part of the team.’

4.5 Chapter summary

Through the case study research strategy and by relying on the critical incident technique, a semi-longitudinal case study with 13 critical incidents has been developed in this chapter. The case offers an elaborated account of the process in which the automotive manufacturing firm, **SHAMMA**, developed and handed over *Alpha* as an innovation project by drawing on its dynamic capabilities.

Chapter Five: Findings

5.1 Preface

The previous chapter explained how the *Alpha* project was planned, implemented and handed over by detailing the critical incidents that occurred during the life of the project from its initiation. It also highlighted the roles played by the different actors engaged in the project, such as *Alpha's* engineers, managers and suppliers, **SHAMMA's steering group** and other shareholders, and the impact of these roles on the project's various stages. It also examined the effect of the collective agents such as governments and their governmental legislations on the development of the vehicle protection bags. Such detailed exploration of *Alpha's* critical incidents does reflect the participants' recollections of their individual actions and involvement in the development of the protection bags, and, as Cope (2005) argued, this expresses the firm's collective behavior, social interactions and situated learning that impact on that development. This chapter firstly presents the main findings of the current research and then incorporates the theoretical accounts previously developed in **Chapter Two**. In other words, the purpose of this chapter is to detect the intersections between the materials of *Alpha* case study and the three academic perspectives/fields of this research (dynamic capabilities, structuration and innovation) before explaining them in an integrative way.

The first section of the chapter (pertaining to the first research question) attempts to explain the connection between the critical incidents of *Alpha* and the five processes of dynamic capabilities (learning, reconfiguring, leveraging, coordinating and integrating and energizing slack resources), which were explained from innovation and structuration perspectives in **Chapter Two**. A specific assertion was made as regards the three

structural properties of structuration theory (signification, domination and legitimation), while explaining the intersections between the activities, motives and scenarios of each critical incident of *Alpha* and the processes of dynamic capabilities. The second section of the chapter (pertaining to the second research question) seeks to define the types of innovative dynamic capabilities (protective or destructive) that **SHAMMA** used while planning, developing and handing over *Alpha*. It is identified the type of method used by **SHAMMA** to combine the rules applied to *Alpha* and the facilities allocated to it, as well as the activities implemented by *Alpha's* different actors. Then, the identified innovation development method is matched to the conceptualisations and attributes of both types of innovative dynamic capabilities to determine whether **SHAMMA** was protective or destructive in the development of the protection bags. In addition, the three elements that define dynamic capabilities from a structuration perspective, which are the actors' perception of the social context from which they interact and act, their own knowledge of their roles and the flow of their protective or destructive actions, are always taken into consideration.

5.2 Explaining the links between *Alpha's* critical incidents and the processes of dynamic capabilities from a structuration perspective

This section explains the intersections between *Alpha's* critical incidents and the processes of dynamic capabilities that influenced their occurrence, taking into account the structural properties that informed, facilitated and impacted these intersections (represent the structure aspect of structuration) and the actors' drawing on their external and internal structures to contribute to *Alpha* (represents the agents aspect of structuration). The intersections are explained below according to the time sequence of *Alpha's* critical

incidents, starting from planning for *Alpha* and concluding with its hand over and termination.

5.2.1 Processes of dynamic capabilities associated with planning for *Alpha*

5.2.1a Learning

The planning adopted by **SHAMMA** for the vehicle protection bags project was indicative of a reliance on **the creative learning process of dynamic capabilities** as it comprised at least two of those elements that usually drive the development of innovations, and which are characterized by a long product life cycle. These are the product advancing process that identifies the innovating firm's customer needs and can be a source to find those needs and, most importantly, the firm senior management's ability to generate its own innovation concepts.

Regarding the first element driving innovation development, **SHAMMA's** understanding of their customers' (dealers, in particular, overseas dealers) needs for double protection for vehicles exported throughout the world, does not reflect a creative learning behavior as these needs were clear enough for the firm considering the number of warranty claims it used to receive annually. However, new ideas that allowed the firm to create new resources and facilities for the purpose of satisfying these needs by developing an entire innovation project from scratch is an indicator of creativity while learning to plan a project. This does not only indicate **SHAMMA's** learning approach, which is to synthesize the required data about a planned project, but also reflects how it mastered its knowledge foundation and the synthesized data in a revolutionary way to initiate *Alpha*. Furthermore, it is indicative of how **SHAMMA** took advantage of this foundation to sanction *Alpha's* activities (identifying the project scope) while planning for it.

Regarding the second element driving innovation development, the failure of **the Quality Division** of SHAMMA led by **the quality engineering director** to seize a protection opportunity that could address its chronic problems, the increasing number of warranty claims within the boundaries of its direct and indirect rivals, did not stop it from searching for other practicable solutions. Instead, its endeavours were directed towards internal creation as it was authorised by **the Executive Committee** of SHAMMA to use the firm's existing resources and to create new resources. Although the *Alpha* project does not represent a type of “technology bubble” emerging from **R&D**, the way in which **the Quality Division** exploited the broad authority it was given by the senior management of the firm by relying on its firm-specific advantage and internal know-how to generate the concept of innovative vehicle protection bags demonstrates exploitation of **the creative learning process associated with SHAMMA's dynamic capabilities**. This exploitation can be explained in two respects. First, it shows how **Quality Division** creatively capitalized on this authority in directing most of its personnel towards generating innovative concepts and completing the design of the protection bags in a relatively short term (approximately three months). This was achieved by using the firm's “transformative capacity that generates command over people”. Second, it reflects how the dominant actors of **Quality Division**, who led and supervised the planning process of *Alpha*, notably, **the quality engineering director**, took advantage of this authority in exploiting their own creativity and learning capacities to develop the protection bags concept. Given that those actors were the main decision makers and approvers while planning for *Alpha*, it was crucial to make their own creative contributions in order to deliver the concept in such a relatively short time. For example, **the quality engineering**

director's role was to identify the design features of the protection bags, and devise the quality procedures and specifications needed, while developing them and drawing the outline for the verification and validation procedures which the development of such bags requires.

The planning process of *Alpha* included a number of unique and prominent contributions of specific individuals within **the Quality Division**, such as **the quality engineering director**, to identify, specifically, the innovation scope (the characteristics, the design and the functionality of the vehicle protection bags). However, such contributions do not necessarily imply that the planning process emerged from the individual creative learning process of SHAMMA's dynamic capabilities. Rather, it emerged from **a collective creative learning process of the firm's dynamic capabilities**. Evidence of this is the direct and influential involvement of the senior representatives of the firm's key functions/divisions especially in identifying the project scope (the activities, facilities and norms needed to develop the protection bags) of the planning process. Such involvement reflects a sort of duality between the social context within which SHAMMA's **steering group** members communicate and act with common but specialized understanding of the mechanism in which *Alpha* should be initiated (each member of **the steering group** perceived the planning process of *Alpha* from a specialized perspective specific to the division he was representing but retained shared understanding of the whole process), and how **the creative collective learning process that represents SHAMMA's dynamic capabilities** is crucial in driving the whole planning process as each member's individual/sectional knowledge outputs forms a collective knowledge base that ultimately accomplishes the planning phase of *Alpha*.

5.2.1b Coordinating and integrating

The invitation sent by **the Quality Division** to those in senior roles within the key functions of SHAMMA in order to engage them in the planning stage of *Alpha* is indicative of **the coordinating and integrating process of dynamic capabilities**. This process can be better explained through the three properties of structuration theory. First, **the Quality Division**, represented by **the quality engineering director**, signifies a specific need to bring in external “minds” (**the steering group’s** members) into *Alpha’s* circle of decision-makers through a series of bi-weekly planning meetings. This links the innovation system (*Alpha* project) to the larger system of SHAMMA where its mainstream activities such as **procurement** and **finance** are exercised. This insistence on allocating prominent roles for **the steering group** in the planning process of the project reflects the belief of **the Quality Division** that a determinant of innovation project success is captured by its ability to fit with the larger system of their firm. Second, the capacity of **the Quality Division** to manage the dependencies among the integrated actors engaged in the planning stage of *Alpha* and to harness their diverse knowledge to its benefit is derived from the authority of **the quality engineering director**, as he was the person who chaired **the steering group’s** meetings during the planning stage of the project. Third, directing the expertise of **the steering group’s** members, who are external to **the Quality Division**, towards a specific direction, which is identifying the scope of *Alpha* as a new project, indicates the ability of **the quality engineering director** to rely on some rules for the sake of proactively perceiving the hazard of permitting the external planners to play roles in those areas that are crucial and specific to **the Quality Division** and *Alpha* team, such as identifying the innovation scope and recruiting the suppliers. Thus, **the quality engineering director** has the ability to balance their intervention in

Alpha planning.

(1) <i>Alpha's</i> critical incident	(2) Influential structural property	(3) Agents' reliance	(4) Process of dynamic capabilities	Link between (2), (3) & (4)
Planning for <i>Alpha</i>	Legitimation	The members of SHAMMA's steering group relied on the knowledge foundation of their external structure to identify the facilities needed to develop <i>Alpha</i> project and most importantly the norms that ensure an appropriate development of the project.	Learning	The link can be seen in the way SHAMMA mastered its knowledge foundation to sanction <i>Alpha's</i> activities (identifying the project scope) while planning for it.
Planning for <i>Alpha</i>	Domination	The quality engineering director and the body engineering quality manager exploited the existing creativity of the Quality Division to enforce a quick development of <i>Alpha</i> .	Learning	The link can be seen in the mechanism by which the Quality Division creatively capitalized on its authority in directing the efforts of its personnel towards generating an innovative concept in a relatively short time and exploiting the creativity and learning capacities of its influential actors to develop the concept.
Planning for <i>Alpha</i>	Signification	Each member of SHAMMA's steering group drew on his understanding of his fellows' knowledge to complement its own knowledge while planning for <i>Alpha</i> .	Learning	The link can be seen in the impact of the individual/sectional knowledge outputs of each steering group member in forming a collective knowledge base that ultimately accomplishes the planning phase of <i>Alpha</i> .
Planning for <i>Alpha</i>	Signification	The quality engineering director drew on his relationships in his larger external structure (the	Coordinating & integrating	The link can be seen through specific meaning of bringing external "minds" (the steering group's members) into <i>Alpha's</i>

Table 1: Summary of the links between *Alpha*'s first critical incident and the related

		whole SHAMMA) to encourage outsiders of the Quality Division to take a part in <i>Alpha</i> .		circle of decision makers to the innovation system (<i>Alpha</i> project) to the larger system SHAMMA .
Planning for <i>Alpha</i>	Domination	The quality engineering director drew on his power in his larger external structure (the whole SHAMMA) to exploit the specialized knowledge the outsiders of the Quality Division have for the benefit of <i>Alpha</i> .	Coordinating & integrating	The link can be seen in the quality engineering director exploitation of his own power to harness the diverse knowledge of the integrated actors engaged in the planning stage of <i>Alpha</i> .
Planning for <i>Alpha</i>	Legitimation	The quality engineering director drew on his understanding of the specific norms of his smaller external structure (the Quality Division) to balance the influence of the outsiders of the Quality Division in <i>Alpha</i> .	Coordinating & integrating	The link can be seen in the quality engineering director imposition of rules to proactively prevent the external planners from playing roles in those areas that are crucial and specific to the Quality Division and <i>Alpha</i> team.

processes of dynamic capabilities from a structuration perspective

5.2.2 Processes of dynamic capabilities associated with start of developing *Alpha*

5.2.2a Learning

At the beginning of converting the innovative concept of vehicle protection bags into practice, two incidents highlighted *Alpha* team members' utilization of **the creative learning associated with their firm's dynamic capabilities**. Specifically, these concerned the way in which they initially sought knowledge to perceive their own roles within the project and then to understand them in relation to the level of innovation of the protection bags development. The first incident was the sum of "knowledge alimentation" of the *Alpha* members including their **team leader** as regards the individual and collective roles assigned to them during their series of meetings with **the body**

engineering quality manager of the Quality Division and **the steering group** of the firm. Following such “knowledge alimentation” meetings, *Alpha* members showed ingenuity in learning how to take advantage of this sum of knowledge to enhance understanding of their own responsibilities in the *Alpha* project. This was an attempt to match their own individual and collective knowledge with the level of innovation the development of the protection bags requires. The second incident concerned the *Alpha* team’s evaluation of their sectional and institutional knowledge and the capability of such knowledge to inform and guide their actions in all the project’s aspects. Such evaluation was vital as it revealed at an early stage some knowledge deficiencies and gaps, notably in the design aspect of the protection bags, which then guided the team in determining the scope of intervention required from external shareholders, especially suppliers in the project development activities. The early knowledge evaluation and detection of knowledge gaps reflect thoughtful understanding of the degree of novelty associated with *Alpha* and the realization that such gaps can hamper the pace of innovativeness required for the project if the internal knowledge was not combined with the right external expertise.

5.2.2b Coordinating and integrating

The type of interaction between the *Alpha* team, on the one hand, and the **procurement** and **finance** departments, on the other hand, is consistent with **the coordinating and integrating process of dynamic capabilities**. This is because it involved collaboration at the level of mainstream functions of **SHAMMA** and horizontal coordination between some independent parties within the firm. Such collaboration and coordination were facilitated by the element of power. The integration occurred between **the Quality**

Division and the **procurement** and **finance** departments for the objective of issuing **PDLs** (Programme Direction Letters) that financially empower the *Alpha* team to purchase the necessary materials needed to create new resources, and which is evidence of that power element.

Table 2: Summary of the links between *Alpha's* second critical incident and the related processes of dynamic capabilities from a structuration perspective

(1) <i>Alpha's</i> critical incident	(2) Influential structural property	(3) Agents' reliance	(4) Process of dynamic capabilities	Link between (2), (3) & (4)
Start of developing <i>Alpha</i>	Signification	The developers of <i>Alpha</i> , specifically, the three project engineers, their team leader and their body engineering quality manager relied on the instructional rules that govern the execution and the commercialization of their respective artifact (<i>Alpha</i>) to understand how much novelty should be brought into it.	Learning	The link can be found in <i>Alpha</i> members' careful consideration of their project's degree of novelty. This was done by matching their own knowledge with the level of novelty the development of the protection bags requires and evaluating the relevant sectional and institutional knowledge in terms of the capability of such knowledge to inform and guide their actions in all the project's stages.
Start of developing <i>Alpha</i>	Domination	The quality engineering director and the body engineering quality manager exploited their authoritative positions in their larger external structure to authorize <i>Alpha's</i> activities.	Coordinating & integrating	The link can be seen in the financial authority acquired by the <i>Alpha</i> team as a result of the integration of the Quality Division and the procurement and finance departments for the objective of issuing the required PDLs .

5.2.3 Processes of dynamic capabilities associated with arrival of suppliers

5.2.3a Learning

The way in which the *Alpha* team evaluated the capabilities of its project's suppliers and managed its relationships with them increases the likelihood that **the creative learning process of SHAMMA's dynamic capabilities** supported such evaluation and management. First, **the Quality Division's** reliance on *Alpha's* experienced leader in assessing the capabilities of the three suppliers based on their capacity to be consistent with the requirements identified by the *Alpha* team for the development of the protection bags and the high degree of novelty associated with this development, can result from a learning capability. However, his interaction with them (specifically, the **Italian** supplier that participated in developing the prototype version of the bags for **SHAMMA's** different car models), which resulted in directing their specialized knowledge towards the bags development process where the *Alpha* team has inadequate knowledge (some phases of the design development), reflects a learning capability in relation to addressing the team's knowledge deficiencies. Second, the *Alpha* team's utilization of suppliers' expertise, thus preventing any spillover attempt of **SHAMMA's** specific knowledge, is another indication of its learning capability with respect to controlling suppliers' movements within the project. Such learning was represented in the "arm's length relationship" approach adopted by the *Alpha* team in managing its relationships with its suppliers, which proactively prevented them from accessing the critical knowledge specific to **SHAMMA**.

5.2.3b Reconfiguring

Alpha team's capacity to recompose a number of pivotal resources after the project suppliers' arrival, notably, the **Italian** supplier, proves exploitation of **the reconfiguring process affiliated with dynamic capabilities**. The *Alpha* team's decision to weed out

some of the materials brought by the **Italian** supplier during the first visit to **SHAMMA's** first manufacturing plant in **West Central England**, as a consequence of the failure to show ideal consistency with the design of the protection bags, thus leading to the possibility of impeding the development of these bags in a robust way, points towards such exploitation. This exploitation of the reconfiguring capability of **the Quality Division**, represented by the *Alpha* team, does not suggest a random removal of specific resources. Instead, it indicates how creative the *Alpha* team was in identifying the allocative resources that must be weeded out as they could impede the project's progress.

(1) <i>Alpha's</i> critical incident	(2) Influential structural property	(3) Agents' reliance	(4) Process of dynamic capabilities	Link between (2), (3) & (4)
Arrival of suppliers	Signification	The developers of <i>Alpha</i> , specifically, the three project engineers, their team leader and their body engineering quality manager proactively realized which knowledge areas their smaller external structure (the Quality Division) are short at and consequently importing them from external sources.	Learning	The link can be found in the <i>Alpha</i> team's appreciation of the significance of directing the suppliers' specialized knowledge towards the bags development process where the <i>Alpha</i> team has inadequate knowledge.
Arrival of suppliers	Legitimation	<i>Alpha's</i> team leader relied on the existing rules of the Quality Division that govern its relationship with its external suppliers to adopt a slightly discreet approach in managing such relationship with his	Learning	The link can be seen in the "arm's length relationship" approach adopted by the <i>Alpha</i> team in managing relationships with its suppliers, which proactively prevents it from accessing the critical knowledge specific to

		own project's suppliers.		SHAMMA.
Arrival of suppliers	Signification	The developers of <i>Alpha</i> , specifically, the three project engineers, their team leader and their body engineering quality manager relied on their own accumulative knowledge of the innovation projects' technicality that they inherited from their smaller external structure (the Quality Division) to eliminate resources that do not fit with the technicality of <i>Alpha</i> .	Reconfiguring	The link is evident in the <i>Alpha</i> team's understanding of the necessity of removing the materials that are an impediment to the project's progress.

Table 3: Summary of the links between *Alpha's* third & sixth critical incidents and the related processes of dynamic capabilities from a structuration perspective

5.2.4 Processes of dynamic capabilities associated with start of standard development

5.2.4a Learning

There was considerable transformation in the knowledge stock of *Alpha* members with respect to understanding the development process of the vehicle protection bags' standards. The change, from imperfect to sophisticated understanding, was driven by **the creative learning process of SHAMMA's dynamic capabilities**. Such learning was evident in the capability of **the Quality Division**, as represented by **the body engineering quality manager**, who could make use of his own technical know-how in the development process of standards for *Alpha* members as new learners. This was done by making them understand the advanced, specialized and senior management level knowledge of the standards development process. Such understanding was apparent during this critical incident as the specific know-how of **the body engineering quality**

manager in amending, reviewing and approving the standards of SHAMMA’s different innovations empowered the developers of the protection bags standards to comprehend perfectly the way in which these should be inserted into the respective system (SDOT) and how the system can be utilized.

Table 4: Summary of the links between *Alpha’s* fourth critical incident and the related processes of dynamic capabilities from a structuration perspective

(1) <i>Alpha’s</i> critical incident	(2) Influential structural property	(3) Agents’ reliance	(4) Process of dynamic capabilities	Link between (2), (3) & (4)
Start of standard development	Domination	The body engineering quality manager capitalized on his specific structure (the committee of reviewing standards) to export his specialized knowledge as a reviewer of SHAMMA’s standards to the members of <i>Alpha</i> team.	Learning	The link can be seen in the conveying of advanced, specialized and senior management level knowledge of the standards development process to the <i>Alpha</i> team members as new learners. This was done through the body engineering quality manager .

5.2.5 Processes of dynamic capabilities associated with start developing protection bags for different vehicle lines’ cars

5.2.5a Reconfiguring

The response of the *Alpha* team members to the new job distribution, which was circulated to them shortly after they started the production of the protection bags for the cars produced at SHAMMA’s first manufacturing plant in **West Central England**, intersects with **the reconfiguring process of dynamic capabilities**. This intersection is apparent in two cases, which occurred during this critical incident at *Alpha*. First, it is reflected in the way the members of the *Alpha* team, notably, those who were moved to new plants to start developing the production version of the bags for the cars,

reconsidered their individual roles and adapted them to the changes resulting from developing bags different to those bags they were initially developing for differently sized and shaped cars. The capability or resource that was reconfigured in relation to this specific case was the capability of those members to comprehend fully their own roles and exercise them based on this understanding within a very short time. Second, the shift from the collective development of protection bags for a specific vehicle line's cars to the individual development of these bags for different vehicle lines' cars demonstrates a reconfiguring capability too. The capability of resource reconfigured here was the capability of the *Alpha* three project engineers to assign new meaning to their way of working. They started working independently and, above all, matched these meanings to the increased workload stemming from such independence.

5.2.5b Coordinating and integrating

The type of interaction between the *Alpha* team, on the one hand, and the vehicle manufacturing plants, on the other hand, is consistent with **the coordinating and integrating process of dynamic capabilities**. This it is because it entailed collaboration at the level of mainstream functions of SHAMMA and horizontal coordination between some independent parties within the firm. Such collaboration and coordination were facilitated by the element of power. There was horizontal coordination between **the Quality Division**, represented by the *Alpha* team's leader, and two of the vehicle manufacturing plants, represented by the managers of these plants, for the purpose of issuing formal authoritative permission (Line Pull Document) enabling the project engineers of *Alpha*, who are delegated to work at these plants, to show their power requiring subordinates to respond promptly to their commands, and ultimately their

engagement in the development of the vehicle protection bags could be facilitated. This is evidence of that power element.

Table 5: Summary of the links between *Alpha's* fifth critical incident and the related processes of dynamic capabilities from a structuration perspective

(1) <i>Alpha's</i> critical incident	(2) Influential structural property	(3) Agents' reliance	(4) Process of dynamic capabilities	Link between (2), (3) & (4)
Start developing protection bags for different vehicle lines' cars	Signification	The three project engineers of <i>Alpha</i> relied on their reference in their smaller external structure (the team leader) as a source of informing to re-adjust their roles in a way that is consistent with this specific phase of <i>Alpha</i> .	Reconfiguring	The link can be seen in the way the <i>Alpha</i> team members reconsidered their roles as a result of the development of protection bags for differently sized and shaped cars, and assigned new meaning to their way of developing the bags, as a result of each being independently responsible for developing bags of a certain vehicle line's cars.
Start developing protection bags for different vehicle lines' cars	Domination	The three project engineers of <i>Alpha</i> relied on their reference in their smaller external structure (the team leader) as a source of power to authorize their <i>Alpha's</i> activities at the three respective manufacturing plants.	Coordinating & integrating	The link can be seen in the manufacturing authority acquired by the <i>Alpha</i> team as a result of the coordination between the <i>Alpha team's leader</i> and two of the vehicle manufacturing plants' managers for the purpose of issuing the required Line Pull Documents.

5.2.6 Processes of dynamic capabilities associated with overlap of tasks

5.2.6a Learning

Considerable transformation occurred in the knowledge stock of *Alpha* members with respect to the development process of the vehicle protection bags' standards. The change

from imperfect to sophisticated understanding was driven by **the creative learning process of SHAMMA's dynamic capabilities**. Such learning was evident in the capability of **the Quality Division** represented by **the vehicle quality team**, who applied their accumulated data in the development process of standards to *Alpha* members as new learners through understanding of the advanced, specialized and senior management level knowledge of the standards development process. This was apparent during the critical incident as *Alpha* members were empowered by having access to a great volume of existing quality data provided by **the vehicle quality team** of their firm for the purpose of enhancing their technical knowledge of the standards development process. As a consequence, they showed ability to learn how to harness data for the development of their own standards.

5.2.6b Reconfiguring

The *Alpha* team's capacity to recompose a number of pivotal resources during this stage of the project is evidence of the exploitation of **the reconfiguring process affiliated with dynamic capabilities**. In particular, the *Alpha* team's partial replacement of the consumption policy of the *Alpha* project, as a result of the joint decision with their suppliers to employ breathable and non-breathable materials in the development of the protection bags, points to the team's utilisation of a reconfiguring capability as such decision entailed changes in the amount of manufacturing resources, e.g. plastic and rubber used in the development activities. Thus, it was imperative to set new consumption rules and criteria that could be more consistent with the alterations in the project's materials. This exploitation of the reconfiguring capability of **the Quality Division**, represented by the *Alpha* team, does not show a random removal of specific

resources. Instead, it demonstrates the creativity of the *Alpha* team in identifying the allocative resources that must be weeded out due to their affect on their firm's identity.

5.2.6c Leveraging

The *Alpha* team used a bundle of its firm's existing resources during the development stage of the project, which is considered to be an example of **the leveraging process associated with dynamic capabilities**. The utilization of the existing quality and materials data stored by **the vehicle quality team of the Quality Division** is one aspect of that leveraging and can be explained through the three properties of structuration theory.

The team's exploitation of some of the quality data sets that were previously developed for specific innovation projects within **SHAMMA** would not have happened without the activation of leveraging capabilities as it resulted in replicating these data sets in another area, which is the development of the vehicle protection bags' standards. Such replication was supported by the ability of the *Alpha* team members to assess and scrutinize the existing quality data for the purpose of extracting the design and environmental rules set forth in these data and that could be employed in the protection bags' standards. Therefore, their ability to understand the significance of the replication process was vital. It was also supported by the powerful level of authority the team members have as a consequence of their participation in *Alpha*. This authority facilitated access and enabled them to utilise such data for their own benefit as the developers of the *Alpha* project. The *Alpha* team's employment of a number of existing data, comprising information on the materials used in producing the protection bags and their characteristics, provide details on the producer of the materials and explain their hazardous ingredients. For several

existing materials, technical specification sheets compare the different options of materials, highlight the advantages and disadvantages of their use and classify them according to their appropriateness to the design and durability of the vehicle protection bags. This also denotes the team's ability to replicate already existing resources in a new domain. The replication process was not only limited to the materials set forth in these data (the materials data sheets and the materials technical specifications sheets) themselves; it also included the legitimation rules on which the developers of the protection bags relied to govern the use of the selected materials and guide their actions while developing the bags.

5.2.6d Coordinating and integrating

The intersection between *Alpha* project and the **GPDC** of **SHAMMA** (a Global Product Development Cycle made up of 36 months of lead-time in which the firm implements a networked development process that is entirely managed by a digital product development system) falls under **the coordinating and integrating process of dynamic capabilities** given that it interconnects the individual innovation project and a comprehensive product development cycle of the whole firm. Such intersection can be understood through the signification and legitimation properties of structuration theory. First, by providing the *Alpha* team members with explanations of the linkages between their own project and the overall **GPDC** of the firm, the aim was to emphasise distinct meaning and top priority as regards three specific stages of the cycle (the Tooling Trials stage, the Pilot Production stage and the Mass Production stage). These stages involve interactions with the project, so that members can reconsider their roles by taking into account the intersection with the **GPDC**. Second, the introduction of such intersection

aimed to inform members of the *Alpha* team that they and their project were not completely dependent on the **GPDC**. Therefore, they should limit their actions to the permitted areas of the cycle, which are the three stages of interaction with the **GPDC**.

5.2.6e Energizing slack resources

The way in which the *Alpha* team members dealt with the sets of quality data provided by a separate group within **the vehicle quality team**, while they prepared to complete the development of the protection bags' standards, demonstrated that **the energizing process of slack resources associated with dynamic capabilities** was the determining factor in taking advantage of such data. The team employed them in new ways that accelerated the pace of the development of the protection bags and their standards. This energizing process can be understood through the signification property of structuration theory. The *Alpha* team's revision of the existing quality data for the purpose of extracting some environmental and design rules that are valid for application to the standards of the protection bags is driven by the team's willingness to minimize the transaction costs associated with the development of their own standards, notably, the time. Limiting the extraction process to certain rules shows that the team members were adequately aware of the hazards of giving multiple meanings to all or most of these data, which might cause considerable delay in the progress of the development of the bags' standards. This explains their utilization of only the rules that are critical to their roles within *Alpha* and their project's core business.

(1) <i>Alpha's</i> critical incident	(2) Influential structural property	(3) Agents' reliance	(4) Process of dynamic capabilities	Link between (2), (3) & (4)
Overlap of tasks	Domination	The vehicle quality team capitalized on its specific structure (the committee of reviewing standards) to export its specialized knowledge as a reviewing and approving committee of SHAMMA's standards to the members of <i>Alpha</i> team.	Learning	The link can be seen in the conveying of advanced, specialized and senior management level knowledge on the standards development process to the <i>Alpha</i> team members as new learners through the vehicle quality team .
Overlap of tasks	Signification	<i>Alpha</i> team reconciled its own consumption standards with its smaller external structure's (the Quality Division) consumption standards to re-adjust <i>Alpha's</i> consumption policy.	Reconfiguring	The link is represented in the <i>Alpha</i> team's perception of the need to replace some aspects of the project's consumption policy due to their conflict with SHAMMA's identity.
Overlap of tasks	Signification	<i>Alpha</i> team's members relied on their perception of the existing valid quality data of the vehicle quality team in order to match some aspects of them with their own project's standard.	Leveraging	The link is represented in the <i>Alpha</i> team's ability to recognize the significance of replicating some of their firm's existing quality data.
Overlap of tasks	Domination	<i>Alpha</i> team's members relied on the power of their references, represented in the quality engineering director and the body engineering quality manager to facilitate their access to the quality data.	Leveraging	The link is represented in the authority of the <i>Alpha</i> team members who facilitated access to their firm's quality data and to utilise them for their own benefit.

Overlap of tasks	Legitimation	<i>Alpha</i> team's members led by their team leader and the body engineering quality manager relied on their newly developed knowledge that is specific to <i>Alpha</i> to replace the way in which some existing materials should be used.	Leveraging	The link is represented in the ability of the <i>Alpha</i> team not only to replicate some of the firm's existing materials, but also to replicate the legitimate rules of these materials, which govern their uses.
Overlap of tasks	Signification	<i>Alpha</i> team's members utilized from the body engineering quality manager's broad perception of their larger external structure's GPDC (SHAMMA's GPDC) in matching their project with the respective stages of that cycle.	Coordinating & integrating	The link can be seen in attaching distinct meanings to the three specific stages of the firm's GPDC , which involves interactions with their project
Overlap of tasks	Legitimation	<i>Alpha</i> team's members utilized from the body engineering quality manager's broad perception of their larger external structure's GPDC (SHAMMA's GPDC) in guiding their interactions with the respective stages of that cycle.	Coordinating & integrating	The link can be seen in the purpose of informing the <i>Alpha</i> team members about how they should limit their actions within the permitted areas of their firm's GPDC .
Overlap of tasks	Signification	<i>Alpha</i> team's members relied on their reference in their smaller external structure (the body engineering quality manager) to unify the meanings of the existing quality data subject to	Energizing slack resources	The link can be seen in the <i>Alpha</i> team's awareness of the hazard of allocating multiple meanings to all or most of the existing quality data of their firm that can be energized, a doing so might cause considerable delay in the progress of the development

Tab		energizing.		the bags' standards
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Summary of the links between *Alpha's* seventh critical incident and the related processes of dynamic capabilities from a structuration perspective

5.2.7 Processes of dynamic capabilities associated with recyclability restriction

5.2.7a Reconfiguring

The team's capacity to recompose a number of pivotal resources during this phase of *Alpha* is proof of the exploitation of **the reconfiguring process affiliated with dynamic capabilities**. The *Alpha* team's involvement in the environment management system of **SHAMMA**, which copes with the environmental impacts of the firm's manufacturing activities as a business priority, is indicative of the exploitation of a reconfiguring capability. The team was able to waive some materials that had already proven to be suitable for the vehicle protection bags for reasons pertaining to either the inability or expense of their reuse and also for not exceeding the percentage that their firm identifies for the use of landfill materials without affecting the development process of the protection bags, or their design. This exploitation of the reconfiguring capability of **the Quality Division**, represented by the *Alpha* team, does not show a random removal of specific resources; instead, it highlights the creativity of the *Alpha* team in identifying the allocative resources that must be removed as they could impede the project's progress.

(1) <i>Alpha's</i> critical incident	(2) Influential structural property	(3) Agents' reliance	(4) Process of dynamic capabilities	Link between (2), (3) & (4)
Recyclability restriction	Signification	<i>Alpha</i> team's members relied on their perception of the environment management system of their larger external structure (SHAMMA) to ensure consistency with their firm environmental considerations.	Reconfiguring	The link is represented in the <i>Alpha</i> team's perception of the need to remove the landfill materials impeding the project's progress.

Table 7: Summary of the links between *Alpha's* eighth critical incident and the related processes of dynamic capabilities from a structuration perspective

5.2.8 Processes of dynamic capabilities associated with “show car” event

5.2.8a Reconfiguring

The *Alpha* team's handling of the conflict was discussed by the representatives of **SHAMMA's steering group** while assessing the protection bags during the show car event. This was driven by **the reconfiguring process of dynamic capabilities**. The insistence of **the body engineering quality manager** on resorting to standards in settling the disagreements between the **manufacturing** teams, with regard to their demands to double the protection level of the protection bags without taking into account any financial or time considerations, and the **engineering** teams, with regard to their unwillingness to implement further considerable design alterations to the bags, represented a strong willingness to amend speedily, finalize and submit the standards in order to impart more power. In this way, it could be powerful enough to resolve potential conflicts or disagreements.

5.2.8b Coordinating and integrating

The *Alpha* team’s resolving of disagreements was discussed by the members of **SHAMMA’s steering group** during the appraisal process of the protection bags that took place at the show car event. The amendments made as a consequence of such disagreements were driven by **the coordinating and integrating process of dynamic capabilities**. The decision was made by **the body engineering quality manager** to resolve the disagreements between the **manufacturing** teams, with regard to their demands to double the protection level of the bags without taking into account any financial or time considerations, and the **engineering** teams, with regard to their unwillingness to implement further considerable design alterations to the bags by adopting incremental instead of radical amendments to the design. Thus, the **manufacturing** teams could to some extent benefit from additional protection, but, at the same time, the **engineering** teams could not be compelled to harness their considerable resources stock in the implementation of these amendments. Overall, this involved a win-win situation and coordination between comparable powers (the **manufacturing** teams and the **engineering** teams). Such coordination was supported by the objective of balancing the influence of the two parties, so that each could not exercise more power over the other.

(1) <i>Alpha’s</i> critical incident	(2) Influential structural property	(3) Agents’ reliance	(4) Process of dynamic capabilities	Link between (2), (3) & (4)
“Show car” event	Domination	<i>Alpha</i> team’s members led by their body engineering quality manager relied the governing rules of their	Reconfiguring	The link can be seen in the willingness of the body engineering quality manager to give more power to the vehicle protection bags standard

Table 8: Summary of the links between *Alpha's* ninth critical

		artefact (the standard of the protection bags) to resolve any conflict with reviewers of the bags.		by speedily amending and finalizing it, so that it could resolve any potential conflict between the assessors of the bags.
“Show car” event	Legitimation	<i>Alpha</i> team’s members led by their body engineering quality manager relied the governing rules of their artefact (the standard of the protection bags) to ease the tension between the manufacturing teams and the engineering teams.	Coordinating & integrating	The link can be seen in the v in which the body engineer quality manager resorted to the standard of the vehicle protection bags in order to balance the influence of the manufacturing teams and the engineering teams in the development of the bags. Therefore, each could not exercise more power over the other.

cal incident and the related processes of dynamic capabilities from a structuration perspective

5.2.9 Processes of dynamic capabilities associated with final amendments and submission of the standard

5.2.9a Reconfiguring

The *Alpha* team’s handling of the disagreements was discussed by the representatives of **SHAMMA’s steering group** while assessing the protection bags during the show car event. Importantly, the accompanying amendments of the protection bags’ standards were driven by **the reconfiguring process of dynamic capabilities**. The string of reconfiguring activities executed by the developers of the protection bags’ standards immediately after the show car event was informed by their newly acquired knowledge in developing such standards and above all their manager’s (**the body engineering quality manager**) accumulated knowledge. This resulted in recomposing their own standards and amending them in a definite method so that they could be approved by the respective assessors when placed in the respective system.

(1) <i>Alpha's</i> critical incident	(2) Influential structural property	(3) Agents' reliance	(4) Process of dynamic capabilities	Link between (2), (3) & (4)
Final amendments and submission of the standard	Domination	<i>Alpha</i> team's members capitalized on the advanced knowledge that the body engineering quality manager inherited from his specific structure (the committee of reviewing standards) to approve their own project's standard.	Reconfiguring	The link can be seen in the <i>Alpha</i> team's capitalizing on the body engineering quality manager's accumulated knowledge in developing standards to increase chances that the standards of the vehicle protection bags would be approved.

Table 9: Summary of the links between *Alpha's* tenth critical incident and the related processes of dynamic capabilities from a structuration perspective

5.2.10 Processes of dynamic capabilities associated with completing the protection bags for the first vehicle line's cars

5.2.10a Reconfiguring

The finalization activities implemented by *Alpha* team as a final step before completing the development of the protection bags for the first vehicle line's cars are harmonious with **the reconfiguring process of dynamic capabilities**. In particular, the decisive meeting held in the presence of SHAMMA's **steering group**, in which the *Alpha* team's members presented a number of final samples of the protection bags specifically produced for the firm's flagship car models, resulted in the activation of the reconfiguring capabilities within the team. The amendment made to the protection bags based on the comments given by **the steering group** during that meeting indicates the ability of the steering group to draw "scripts" to guide the *Alpha* team members, while finalizing the development process of the protection bags. It also demonstrates the capacity of these

members to perceive fully such scripts and to consider them as informing their reconfiguring actions. The speed at which the amendment was implemented suggests that a sort of common understanding between the *Alpha* team and **the steering group** formed as a consequence of mutual interactions between both parties that reached its peak at this point of *Alpha*'s life and facilitated the reconfiguring activities that were required to amend the bags.

5.2.10b Leveraging

The *Alpha* team's use of its firm's existing resources during the development stage of the project is considered to be an example of **the leveraging process associated with dynamic capabilities**. The usage of some design and standards development systems is one aspect of that leveraging.

The *Alpha* team relied on **SDOT** (the system adopted by **SHAMMA** to evaluate and approve the standards of its different innovations/products) to insert, update and review the standards of the protection bags, and on **FMEA** (a design errors detection system usually used during the development of **SHAMMA**'s different product/innovations) to detect the errors of the protection bags' design, to understand the effect of the detected errors and their function, to perceive how easily these errors could be detected, to identify the occurrence rate of the errors and to comprehend the mechanism in which these errors could be fixed. The team also relied on ByteWorx (the operating system of **FMEA**) to access a string of reports and analyses that facilitate the use of **FMEA** and provide them with a complete range of visual and reporting instruments that aid in conducting the risk assessments needed while using **FMEA**. These were outcomes of a leveraging process as the three systems were all replicated in another domain within **SHAMMA**. This

replication was supported by the ability of the *Alpha* team members to perceive the value behind using these replicated systems in developing the protection bags' standards and design. Furthermore, they had the ability to understand the signification of reusing such institutional systems. It was also backed by the high level of authority of the members of the *Alpha* team as a consequence of their direct engagement in *Alpha*. Ultimately, this enabled them to access **the vehicle quality team** and to exploit the training and learning facilities that were then allocated to them for the sake of enhancing their knowledgeability about such systems prior to employing them in their own project.

5.2.10c Energizing slack resources

The effort exerted by the *Alpha* team in order to conduct the strip test is an indication of its reliance on **the energizing process affiliated with dynamic capabilities**. This was because slack resources were energized prior to conducting the test. Given that this test was conducted in-house, it took the *Alpha* team and **the vehicle quality team**, as a whole, sometime to prepare the place allocated for the test to be in ideal condition. This was attributable to the fact that the allocated facility for the test was not sufficiently equipped with the resources needed for implementing; for example, the system that monitors the interactions between the protection bags and the loading options as well as the required amount of solar. As a consequence, the facility underwent a radical energizing process, which meant that it was ready to carry out the test. Such an energizing process was facilitated by the element of power in the *Alpha* team as well as **the vehicle quality team** as a result of *Alpha* being classified as a top priority project for **the Quality Division**.

(1) <i>Alpha's</i> critical incident	(2) Influential structural property	(3) Agents' reliance	(4) Process of dynamic capabilities	Link between (2), (3) & (4)
Completing the protection bags for the first vehicle line's cars	Signification	<i>Alpha</i> team's members relied on the guiding scripts drawn by their steering group to finalize the completion of the protection bags for the first vehicle line's cars.	Reconfiguring	The link can be seen in the steering group's capacity to draw "scripts" guiding the <i>Alpha</i> team's reconfiguring activities during the finalization of the protection bags development and in the <i>Alpha</i> team's capacity to understand such scripts.
Completing the protection bags for the first vehicle line's cars	Signification	<i>Alpha</i> team's members capitalized on the their larger external structure's existing design and standards systems to finalize the completion of the protection bags for the first vehicle line's cars.	Leveraging	The link can be seen in <i>Alpha</i> team's capacity to detect the significance of replicating some of their firm's institutional design and standards development systems in the development of the protection bags.
Completing the protection bags for the first vehicle line's cars	Domination	<i>Alpha</i> team's members capitalized on the their larger external structure's existing design and standards systems to finalize the completion of the protection bags for the first vehicle line's cars.	Leveraging	The link can be seen in the <i>Alpha</i> team's powerful status, which enabled them to access then use some of their firm's existing institutional design and standards development systems in the development of the protection bags.
Completing the protection bags for the first vehicle line's cars	Domination	<i>Alpha</i> team's members drew on the powerful status of their own project in their smaller external structure (the Quality Division) to revive an entirely slack facility for the purpose of completing the protection bags for the	Energizing slack resources	The link can be seen in the energizing of an entirely slack facility within SHAMMA to conduct the strip test. This was as a result of the <i>Alpha</i> team and the vehicle quality team exploiting the <i>Alpha</i> project's classification by the Quality Division as a top priority.

Tab le		first vehicle line's cars.		
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10: Summary of the links between *Alpha's* eleventh critical incident and the related processes of dynamic capabilities from a structuration perspective

5.2.11 Processes of dynamic capabilities associated with turnover of *Alpha* members

5.2.11a Reconfiguring

The relocation of some of the existing members of *Alpha* to new roles within SHAMMA and the recruitment of new project engineers to take responsibilities for the vacant roles represented a **reconfiguring of dynamic capabilities**. First, the team's reaction to moving two of its core project engineers to new roles within **the plant recall team** of the firm by continuing the development activities of the protection bags is indicative of its ability to readjust its collective and individual roles in a way that was commensurate with such turnover. Although the pace of the protection bags production was to some extent affected as a result of the relocation, the well-informed *Alpha* members eventually overcame the shortage resulting from such relocation. Second, the recruitment of two new project engineers to fill the void left by their predecessors reflects the capacity of the *Alpha* team, in particular, **the team leader**, to accommodate those new resources and combine them with the existing identical resources (the other project engineers who were still working in the project at that time). The engagement of the newly recruited engineers in *Alpha* also shows how they as "new entrants" were informed about their new technical roles and the legitimation rules of *Alpha*. They understood their responsibilities in relation to others who were working with them in the project as they could sanction their actions according to such knowledge.

5.2.11b Energizing slack resources

The significant void left by the departure of two project engineers of *Alpha*, which to

some extent affected the productivity of the project and then forced **the body engineering quality manager** and other senior managers within **the Quality Division** to appoint two alternative engineers to fill that void, resulted in reliance on **the energizing process of dynamic capabilities** as the need to activate new resources (the newly appointed engineers) was urgent. This appointment compelled **the body engineering quality manager** and **the team leader** to accompany the new engineers while visiting **SHAMMA's** manufacturing plants with the aim of enhancing their perception of their new roles within *Alpha* in a practical way. During these visits, they showed them how the team develops protection for bags, providing detailed information on the requirements, the current suppliers of the project and, most importantly, the purpose of developing such bags. Despite the enthusiasm of the new entrants to comprehend entirely the information they were provided during their induction visits to the manufacturing plants, their understanding of the roles assigned to them was for sometime imperfect. This urged those responsible for *Alpha*, notably, **the body engineering quality manager** and **the team leader**, to continue energizing the new engineers, over approximately 45 days, to realise their roles within the project and to be as knowledgeable as their ex-colleagues. These 45 days of energizing can be explained through the signification property of structuration theory: the imparting of a large amount of information to the knowledge inventory of the newly appointed engineers in a relatively short time without gradation, so that cognitively they were in a good position to take on responsibility for developing the protection bags for the rest of **SHAMMA's** vehicle lines' cars. In this state of "information asphyxiation" the vital information about their new roles mingled with the complementary, extra and surplus information about these roles. Such a mixture slowed the pace of the new

engineers' productivity at the beginning of their recruitment, so that they needed for the period of a month and a half to focus only on the information that crucially and directly affected their roles, and to remove the surplus information from their knowledge inventory. As a consequence, the pace of their productivity was accelerated.

(1) <i>Alpha's</i> critical incident	(2) Influential structural property	(3) Agents' reliance	(4) Process of dynamic capabilities	Link between (2), (3) & (4)
Turnover of <i>Alpha</i> members	Signification	<i>Alpha</i> team's members relied on their internal structure (their perception of their own roles) and their <i>Alpha's</i> well-developed knowledge to encounter the turnover obstacle.	Reconfiguring	The link can be seen in the well-informed <i>Alpha</i> members, who overcame the shortage resulting from the relocation of some members to new roles within the firm.
Turnover of <i>Alpha</i> members	Legitimation	<i>Alpha</i> new team's members benefited from the well-developed <i>Alpha's</i> knowledge of their team leader to sanction and inform their <i>Alpha's</i> activities.	Reconfiguring	The link can be seen in the <i>Alpha team leader's</i> ability to inform the newly recruited members about the legitimation rules of the project. In this respect, the understanding of their roles in relation to their colleagues and respective shareholders could be enhanced.
Turnover of <i>Alpha</i> members	Signification	<i>Alpha</i> new team's members benefited from the well-developed <i>Alpha's</i> knowledge of their team leader and their body engineering quality manager in eliminating any information that are not directly related to their new roles.	Energizing slack resources	The link can be seen in the body engineering quality manager's and <i>Alpha team leader's</i> ability to assist the new recruits in <i>Alpha</i> to cope with the state of "information asphyxiation" they experienced through filtering the information specific to their roles.

Table 11: Summary of the links between *Alpha*'s twelfth critical incident and the related processes of dynamic capabilities from a structuration perspective

5.2.12 Processes of dynamic capabilities associated with termination and handing over of *Alpha*

5.2.12a Leveraging

The decision made by the **Quality Division** of SHAMMA, notably, **the body engineering quality manager**, to hand over *Alpha* to a number of related parties within the **Body Engineering Division** and its consequences, represents a practical application of **the leveraging process inherent in dynamic capabilities**. This is attributable to the fact that handing over *Alpha* with its different facilities and rules to the respective **COCs** (Centres of Competence) within the **Body Engineering Division** is an extension of a specific process or project into other contexts within the same firm. Such internal extension can be understood in relation to two structural properties. First, **the Quality Division's** selection of the **COCs** to hand them the project is justified by specific signification, namely, their possession of practical engineering knowledge and lasting institutional capabilities that can sponsor the *Alpha* project. In addition, they are the original developers of SHAMMA's cars components; therefore, each can develop the protection elements of the bags associated with the component each **COC** develops based on the approved existing standards of the protection bags in a relatively short time compared with other parties in SHAMMA. Second, the formal way in which **the Quality Division** handed over *Alpha* to the respective **COCs** reflects the distinct influence and the great power that it can exercise over its related parties within SHAMMA.

5.2.12b Coordinating and integrating

The decision made by **the quality engineering director** based on the recommendation of

the body engineering quality manager to hand over the *Alpha* project to a number of parties within the **Body Engineering Division** and its accompanying activities is evidence of **the coordinating and integrating process of dynamic capabilities**. This involves coordinating between the original developer of the project (**the Quality Division**) and the later recipient (**the Body Engineering Division**, represented in its **COCs**) and integrating *Alpha's* resources with the resources of the recipient parties. The handing over process can be illustrated in relation to two structural properties: domination and legitimation. First, the formal request issued by **the Quality Division** and received by the **COCs** of the **Body Engineering Division**, with respect to taking responsibility for developing the protection element(s) of the bag associated with the part/component that each **COC** originally developed, indicates that the coordination between the two dependent parties was driven by the element of power. In this regard, the authority of the **Quality Division** extended over the **Body Engineering Division**. Second, handing over the entire *Alpha* project with its associated norms, resources and facilities to the respective **COCs**, on the one hand, and providing the seven to eight engineers of each **COC** with the necessary support in relation to understanding the standards of the protection bags, on the other hand, reflects how **the Quality Division**, in particular the *Alpha* team, relied on the legitimation rules of the project (the standards) to reduce the dependency of the **COCs** on them and their division when those **COCs** carried out *Alpha* activities.

(1) <i>Alpha's</i> critical incident	(2) Influential structural property	(3) Agents' reliance	(4) Process of dynamic capabilities	Link between (2), (3) & (4)
Termination and handing over of <i>Alpha</i>	Signification	<i>Alpha</i> team's members relied on the existing knowledgeability of some of their allied parties in their external larger structure (the COCs) to hand over <i>Alpha</i> .	Leveraging	The link can be found in the Quality Division's reliance on its decision to hand over <i>Alpha</i> to the COCs , which is represented in the latter's possession of practical engineering knowledge and lasting institutional capabilities that can sponsor <i>Alpha</i> .
Termination and handing over of <i>Alpha</i>	Domination	<i>Alpha</i> team's members exploited the power of their references in their smaller external structure, represented in the quality engineering director and the body engineering quality manager to enforce the handing over of <i>Alpha</i> .	Leveraging	The link can be seen in the Quality Division's influence over the COCs , which compelled the latter not to resist taking responsibility for <i>Alpha</i> .
Termination and handing over of <i>Alpha</i>	Domination	<i>Alpha</i> team's members exploited the power of their references in their smaller external structure, represented in the quality engineering director and the body engineering quality manager to enforce the required coordination between them and the COCs while handing <i>Alpha</i> over.	Coordinating & integrating	The link can be seen in the coordination driven by the element of power between the original developer of <i>Alpha</i> (the Quality Division) and the late recipient (the COCs).
Termination and handing over of <i>Alpha</i>	Legitimation	<i>Alpha</i> team's members relied on the well-developed and approved standard of their own project to sanction and	Coordinating & integrating	The link can be seen in the support provided by the Quality Division to the COCs with regard to the legitimation rules of <i>Alpha</i> (the standard)

Table 12: Summary of the links between <i>Alpha's</i> thirteenth critical incident and the related processes of dynamic capabilities from a structuration perspective		inform the activities of the COCs while carrying out <i>Alpha</i> .		for the sake of reducing the dependency of the latter on the former.
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After detailing the findings associated with the first aspect of this research's theoretical accounts by explaining the links between *Alpha's* critical incidents and the processes of dynamic capabilities from a structuration perspective in the above section of this chapter (5.2), the next section (5.3) discusses the findings associated with the second aspect of this research's theoretical accounts through explaining the type of innovative dynamic capabilities by which the *Alpha* project was driven. Combining these two sections is justified, as the first section is only able to explain the individual impacts the five processes of dynamic capabilities have on the series of critical incidents relating to *Alpha*. It is not, however, able to explain the collective impact of these processes on the social structure of **the Quality Division** within the body engineering quality domain and the relevant innovation development process in terms of continuity or change. Therefore, what *Alpha* has introduced to the respective social structure and dominant innovation is explained in the following section.

5.3 *Alpha* project as an outcome of SHAMMA's destructive innovative dynamic capabilities

Based on the narrative of the *Alpha* project presented in **Chapter Four** and the explanation given in the above section with respect to the connection between *Alpha's* critical incidents and the processes of dynamic capabilities from a structuration perspective, it can be argued that the way in which **SHAMMA** combined the rules

applied to *Alpha* and the facilities it was allocated and the actions of its different actors from its initiation until its handing over is consistent with the destructive type of innovative dynamic capabilities rather the protective type (both types are explained in **Chapter Two**) in terms of conceptualization and attributes. This is justified by the fact that the development of the *Alpha* project is obviously associated with the change aspect of the structuration process, not only at the technicality level of the protection process adopted by **the Quality Division**, but also at the level of the interpretative schemes of the signification structure rooted in the mentality of those actors responsible for protecting the body of SHAMMA's different car models before the initiation of *Alpha*. It also has connections with the level of the existing power of those actors in the domination structure due to the reallocation of the existing facilities to the protection activities within **the Quality Division** as well as the creation of new facilities required for the development of *Alpha*, and has connections with the level of norms previously used to govern the interaction between those actors in the legitimation structure, which were replaced by a new set of norms specific to *Alpha*.

In relation to the signification structure, *Alpha* was developed as a result of its knowledgeable actors' will to replace the existing system of signification of the body engineering quality domain within **the Quality Division** with a new one. This was implemented by not only substituting the meanings of the existing norms/rules used to govern the body protection activities within that division, but also by creating new rules/norms that fit more with the social structure being reconstituted and the innovation project being developed. The change resulted from *Alpha's* learning, reconfiguring, leveraging, coordinating, integrating and energizing activities is therefore influenced by

such new rules and meanings.

In relation to the domination structure, *Alpha* was developed as a result of the placement of some powerful figures (**the quality engineering director & the body engineering quality manager**) into its heart. This placement enabled the creation, reconfiguration, leveraging, integration, coordination and energizing of allocative resources/facilities through authoritative destructive actions.

In relation to the legitimation structure, *Alpha* was developed as a result of the symmetry between the way in which its facilities/resources was used and the new set of sanctions and inducements that newly emerged to govern the project's legitimate social interaction and actions.

The changes stemmed from the development of *Alpha* in relation to the existing type of innovation; the existing social structure and the existing corporate agents are explained below.

5.3.1 Change associated with the existing type of innovation

The internal generation of the concept of innovative vehicle protection bags by **the Quality Division** of SHAMMA does not only signify a change in the trajectories of the process espoused by the division to protect the external surface of their firm vehicles' body. Neither does it only represent a change in the matter adopted by the division as a solution for its major technical problem, which is the increasing number of warranty claims generated by the firm's dealers across the globe as a result of the exposure of its vehicles to any form of damage during transfer to the ports of entry. Instead, it represents a change in the entire "technological paradigm" or "innovation concept" that was

dominant within the division for vehicle body protection purposes prior to generating the concept of the vehicle protection bags. In other words, the dominant innovation failed to weather the storm of the newly generated innovation as the latter succeeded in entirely destroying it and introducing itself as a novel alternative to the former. This implies that the alternative innovation should be considered as a “product discontinuity” rather than a “process discontinuity” (Tushman & Anderson, 1986) as it re-signified the future meaning of the vehicle body protection. In particular, the protection of the external surface of the body and its development entailed recruitment of new influential actors, the employment of new knowledge and capacities. This can be clearly seen in two specific aspects: the generation of the concept of vehicle protection bags from scratch and the high degree of novelty this concept has.

First, the concept was not formulated as a result of improving the performance of an established vehicle protection concept or experimenting on a vehicle protection technological paradigm. It also did not emerge as a result of combining the essence of a developable vehicle protection innovation concept from outside with the creativity possessed by SHAMMA as **the Quality Division** was initially intending to do. It was in fact born as a result of the division’s complete reliance on its firm-specific advantage and internal know-how. Such internal generation of the concept from scratch proves that the new concept should not be classed as “competence-enhancing”; it should be however classed as “competence-destructing”. Second, there was an amount of knowledge individually and collectively generated by the influential actors of *Alpha*, notably, **the quality engineering director and the body engineering quality manager**, which resulted in the idea to have a breathable coat on the entire exterior surface of

SHAMMA's vehicles resistant to severe climatic conditions, and double protection bags that could not be exposed to any sort of deformation while exporting to overseas dealers. The large amount of financial resources (£5 million) and non-financial resources allocated to transform this idea into action is indicative of the high degree of novelty *Alpha* project entails. Both aspects, therefore, point towards the success of such a project in redefining the meaning of the vehicle body protection. This was accomplished by entirely replacing a dominant vehicle body protection innovation concept by a new concept characterized by a new technicality and different ingredients.

5.3.2 Change associated with the existing social structure

As earlier explained, the destructive innovative dynamic capabilities enable the destruction of an existing social structure, redefine its rules and renew its facilities. As I was able to track *Alpha's* life cycle, especially its early stages, it was noticed that the social structure of **the Quality Division** of **SHAMMA**, in particular, within the body engineering quality domain, was entirely reconstituted as a consequence of the development of *Alpha*. Given that the structure was defined as both the rules that govern the process of structuration and the facilities used by human actors to interact and act, such reconstitution involved the two parts of the structure.

With respect to the rules, I previously explained that each technological paradigm or innovation concept should be at least accompanied by two new sets of rules: a set of rules that govern the development of the technicality of the new innovation concept, which are subject to amendment, and a set of instructional rules that guide the development and the commercialisation processes of that concept. For the concept of the vehicle protection bags, the rules associated with its technicality were represented in the standards (the

design and environmental rules) as it as a genuine document used to define each design, technical and environmental aspect of the vehicle protection bags concept such as explaining from which materials these bags should be made, identifying the amount of materials needed, defining the design rules, defining the environmental governmental-institutional aspects of the protection bags and drawing the key features of the consumption policy that should be adopted while developing the bags. In contrast, the rules associated with governing the development and the commercialisation processes of the concept of vehicle protection bags were instructional in nature rather than technical. Besides the rules that were used to guide the development aspect, the **PDLs** (Programme Direction Letters) by which the *Alpha* team members were sufficiently empowered financially so that they could proceed on their project's activities and the Line Pull Document which delegated the project engineers of *Alpha* to **SHAMMA's** different manufacturing plants were relied on to demonstrate their powers to the plants' subordinates, so that they could promptly respond to their commands. In addition, the rules on the requirements of the commercial bodies in the import countries, concerning their permission or refusal of the vehicles coated with protection bags to enter their ports, were followed to govern the commercialization aspect. Both sets of rules impacted upon the *Alpha* actors while creating their distinct social structure and, therefore, influenced their actions during the development of the vehicle protection bags.

With respect to the facilities, the development of the vehicle protection bags impacted upon the resources base of **SHAMMA**, specifically, within **the Quality Division**, the body engineering quality domain. Such impact did not only lead to recomposing the division's existing allocative and authoritative resources for the benefit of *Alpha*, such as

waiving some materials that had already proven their suitability for the vehicle protection bags as a result of the *Alpha* team complying with the environment management system of **SHAMMA** which deals with the environmental impacts of the firm's manufacturing activities as a business priority. Neither did it only extend these resources into the domain of the vehicle protection bags development or replicate them in that domain, such as the team's reliance on **SDOT**, ByteWorx and **FMEA** systems in the development activities of the protection bags. It also did not simply energize some slack resources, such as preparing the facility allocated for the "strip test" to be in the ideal condition for conducting the test; it was not sufficiently equipped with the resources, for example, the system that monitors the interactions between the protection bags and the loading options as well as the required amount of solar. Most importantly, it created new resources that are consistent with the type and size of change at *Alpha*. These resources firstly took the form of the revolutionary knowledge generated by the senior management of **the Quality Division** for driving the formation of the vehicle protection concept. They then took the form of the facilities allocated to convert that concept into a final product, such as the development of a prototype version of the bags, the testing and validating of the instruments and the amended final samples. Ultimately, such resources facilitated the informed actions of the Alpha team while developing the bags.

5.3.3 Change associated with the existing corporate agents

The corporate agents, as defined earlier, are those "who personified key roles" (Llewellyn, 2007, p.148) and who are characterised by their ability to constitute the cultural and structural context in a way that is consistent with the interests of external agents. As regards the *Alpha* case study (**Chapter Four**), at least four different corporate

agents can be identified. Most of those agents were not previously so influential within the social structure of **the Quality Division**, the body engineering quality domain of **SHAMMA**. Their emerging influence was an outcome of the change element associated with their firm's destructive innovative dynamic capabilities. In particular, these types of dynamic capabilities are distinguished by replacing the respective corporate agents or entirely changing their innovation philosophy, so that they can end their innovation traditions and differently interact with their external agents or, alternatively, interact with new agents.

Four corporate agents have been identified within the context of *Alpha*: **SHAMMA's quality director, the quality engineering director of the Quality Division, the body engineering quality manager of the Quality Division and Alpha's team leader**. First, the newly **appointed director of quality** was critical in reconstituting the cultural and structural context of **the Quality Division**, the body engineering quality domain, in a way that was consistent with the interests of customers as a crucial type of **SHAMMA's** external agents. Her identification of various areas for improvement, notably, in terms of the vehicle exterior protection, to improve **SHAMMA's** position in some of the customer satisfaction surveys, represented one aspect of the change in the corporate agents of this specific division/domain within the firm. Second, **the quality engineering director** also contributed to reconstitute the context of **the Quality Division**, the body engineering quality domain, while considering the interests of another type of the firm's external agents that is its overseas dealers. This contribution was evident in his direct management of the internal generation process of the vehicle protection bags concept for the purpose of preventing the firm's cars from being exposed to any type of damage during their

transportation to their firm's overseas dealers. Third, **the body engineering quality manager** was also influential in the reconstitution process in two respects. He played a key role in supervising the development process of the vehicle protection bags' standards and a mediation role in resolving the disagreements between the different assessors of the bags. He also considered the requirements of the third type of **SHAMMA's** external agents while developing the protection bags, namely, the respective environmental, commercial and governmental bodies in the dealers' countries. Fourth, the **Alpha team leader's** interaction with the fourth type of **SHAMMA's** external agents, that is its suppliers, also impacted on the reconstitution of the social structure of the body engineering quality domain within **the Quality Division**. After he conducted the evaluation process of the suppliers' capabilities, he decided to recruit new suppliers who were unfamiliar with that social structure.

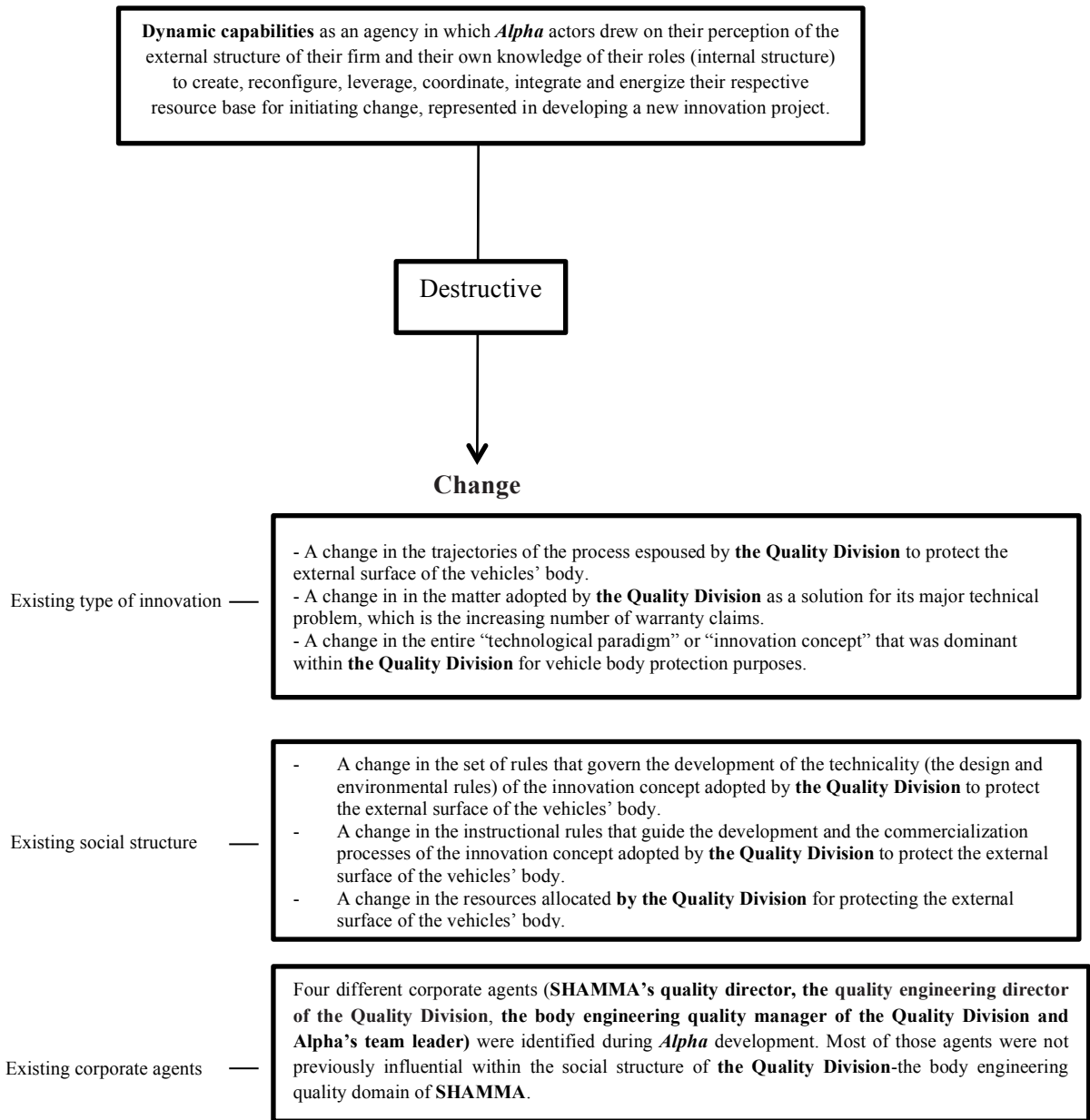


Figure 1: Graphical representation of *Alpha* as an outcome of **SHAMMA's** innovative dynamic capabilities

5.4 Chapter summary

In this chapter, I attempted to combine discussion of the process by which the auto manufacturer **SHAMMA** developed *Alpha* as an innovation project (presented in **Chapter Four**) with the theoretical accounts this research project considered to refine

understanding of dynamic capabilities. The findings reveal how each learning, reconfiguring, leveraging, coordinating and integrating and energizing activities, pertaining to the processes of dynamic capabilities and ultimately contributing to *Alpha*, is influenced by at least one property of structuration theory. They also reveal that the *Alpha* project has brought about change at different levels, which implies that it is not driven by the protective innovative dynamic capabilities, but instead the destructive ones.

Chapter Six: Discussion

6.1 Preface

This chapter seeks to extend the discussion of the *Alpha* case findings, which were presented in the previous chapter, through highlighting the contributions to knowledge of the current research, notably, in terms of the theoretical importance and pertinent insights in the existing literature review. The chapter discusses the integration of innovation with the perspective of dynamic capabilities as a complementary field, and conceptualizes energizing slack resources as a new process of dynamic capabilities. It investigates the processes of dynamic capabilities from a structuration point of view and distinguishes between two types of innovative dynamic capabilities. The chapter also examines the practical implications for those who engage in the innovation development processes of manufacturing firms. In particular, there is discussion of three groups of individuals while considering the practical implications of this research.

6.2 Contributions to knowledge

The explanation of theoretical accounts in **Chapter Two**, the development of the *Alpha* case study in **Chapter four** and the findings presented in **Chapter Five**, which emerged from the intersections between the theoretical accounts and the aforementioned case, confirm that the current research project can at least contribute to knowledge in four different ways. These contributions are detailed below.

6.2.1 Contribution associated with understanding the processes of dynamic capabilities from a structuration perspective

Teece, et al.'s (1997) theorizing of the processes of dynamic capabilities provided a primary understanding of the mechanism by which dynamic capabilities actually work. Such understanding, however, is still modest and needs to be further considered. This

point of view was explicitly introduced by Moliterno and Wiersema (2007), who called for reexamination of what they termed the content of dynamic capabilities (what they consist of) and their impact. This was then repeated in few other studies; Ambrosini and Bowman (2009, p.35), in their comprehensive review of dynamic capabilities, stated that “this being said there are several empirical and conceptual papers that have tried to explain precisely how some specific dynamic capabilities are used”. Building on calls to examine further dynamic capabilities, this research attempted to provide a better understanding of how these operate, by taking into account the theory of structuration (Giddens, 1976; 1979 and 1984; Chiasson & Saunders, 2005; Stones, 2005 and Chell, 2008). It was explained the processes of dynamic capabilities and the factor of “intentionality” with which they are associated, in order to comprehend how each process is intentionally executed, and how such intentionality is guided by specific rules and only extracted from specific actors within the social structure under investigation, while performing the activities pertaining to each process.

Since its early formulation, the perspective of dynamic capabilities has placed special emphasis upon the fundamental roles played by decision makers, strategists and planners in coping with fluctuations in their dynamic markets by either acclimating their firms to these fluctuations, which requires the re-adjustment of their existing resources, or initiating their own change in their respective markets, which entails the creation of new resources (Teece *et al.*, 1997 and Ambrosini & Bowman, 2009). By exploring the current literature, we find that a number of scholars highlight the factor of intentionality in their definitions of dynamic capabilities; for example, the current research relied on defining dynamic capabilities from a structuration perspective, which is “the capacity of an

organization to purposefully create, extend, or modify its resource base” (Helfat, et al., 2007, p. 1), and the definition of Zahra et al. (2006, p.3) which views dynamic capabilities as “the abilities to re-configure a firm’s resources and routines in the manner envisioned and deemed appropriate by its principal decision-maker(s)”. In contrast, the current literature includes some views that are contrary to the argument that stresses the importance of including the intentionality factor while investigating dynamic capabilities. A notable example of this is Barreto (2010), who reviewed the perspective of dynamic capabilities argued that the associated factor of intentionality should be ignored for reasons pertaining to the difficulty of empirically proving its existence. However, by investigating the processes of dynamic capabilities from the perspective of structuration theory, the current research empirically argued against the latter view and endorsed the former as it highlighted that the utilisation of SHAMMA’s dynamic capabilities in *Alpha* development was always supported by objectives understood by those influential actors (directors and managers) involved in *Alpha*’s different stages and evident in their innovative-based actions. I explain below how structuration theory helps in identifying and understanding such objectives, while investigating the activities related to the processes of dynamic capabilities and which were implemented during the planning, development and handing over of *Alpha*.

The adoption of structuration theory in the context mentioned above helped explain what sort of dualities occurred between the social context in which *Alpha* actors communicate and act and their flow of conduct during *Alpha*’s different stages: Are they learning-based dualities, reconfiguring-based dualities, leveraging-based dualities, coordinating and integrating-based dualities or energizing-based dualities? Combining each duality

with a specific process of dynamic capabilities makes it an intentional and oriented duality more than a duality that results from coincidence or that is an outcome of a spontaneous reaction. Thus, the existence of intentionality factor in dynamic capabilities can be proved. The theory also helped in identifying the characteristics of these dualities such as size, required time of attainment, governing rules, required facilities and resources and key actors. As a result, I became aware of the type of planning and preparation associated with each; thus, the likelihood that the use of dynamic capabilities is driven by clear purposes is more likely than the opposite view. Structuration theory was not only a means of identifying the characteristics of the dualities between *Alpha*'s social structure and *Alpha* actors' actions, as I explained above, it also facilitated, most importantly, the identification of the structural property (signification, domination and legitimation) that supported the attainment of each of these dualities pertaining to **SHAMMA's** dynamic capabilities while initiating, extending and handing over *Alpha*. Thus, it clarified which objective made the activation of this specific property (the identified property) important for the success of each duality. This explicitly indicates the actors' intention to rely on the elements of communication, power and/or sanction in their attempts to attain a complementarity between their social structure and their actions, while involved in the activities of the processes of dynamic capabilities in their firm. Therefore, the existence of the intentionality factor in dynamic capabilities can be further proven.

6.2.2 Contribution associated with understanding dynamic capabilities in a combination with innovation as a complementary field

Dynamic capabilities have often been described as mysterious firm property. A distinct example of this is the expression "illusive black box" coined by Pavlou and El Sawy

(2011) to describe their nature. This is viewed by Winter (2003, p. 994) as an outcome of attaching the perspective of dynamic capabilities to some general notions of coping with business turbulence and capturing competitive advantage. He claimed that “probably some of the mystery and confusion surrounding the concept of dynamic capability arises from linking the concept too tightly to notions of generalized effectiveness at dealing with change and generic formulas for sustainable competitive advantage”. The current research contributes, to a considerable extent, to uncover the black box of dynamic capabilities by investigating them in a dualism with innovation as a complementary field. The choice of innovation, in particular, was not random or unintentional; it was instead justified by at least three motives. First, some studies consider product innovation processes themselves as dynamic capabilities (e.g. Danneels, 2002). Second, in some studies, it is strongly argued that dynamic capabilities result in the creation of innovation-based capabilities (e.g. Ellonen, et al., 2011). Third, structuration theory (which I used to investigate dynamic capabilities) is common in innovation research (Pozzebon & Pinsonneault, 2005).

The uncovering of the dynamic capabilities black box by integrating them with innovation has been attained through two methods. First, by explaining the five processes of dynamic capabilities from an innovation perspective, the impact of each process on the innovation development process could be better understood. This contributed to limit the impact of each process and attach it to a specific aspect within the process under investigation (the innovation development process), rather than leaving it generalised. To some extent, this prevented the factors that Winter (2003) emphasized as the causes behind the mysterious nature of dynamic capabilities, and helped to identify (**Chapter**

Five) the specific dimensions of the central activities of the *Alpha* actors during the development of the vehicle protection bags. Most importantly, these activities could be classified into the appropriate category (learning, reconfiguring, leveraging, coordinating and integrating and energizing slack processes) according to their proactively identified impact on the innovation development process. Second, by relying on the technological path (Hung, 2004) as an innovation model that explains the recursive relationship between human action and social structure in innovation development processes, it was possible to theorise two distinct types of innovative dynamic capabilities. I also identified the two types of innovation actions that usually occur during this relationship, and then each was attached to a specific type of the innovative dynamic capabilities mentioned, which is illustrated in depth later in this section (6.2.4) of this chapter.

In general, combining the perspective of dynamic capabilities with innovation is fully consistent with the recent call of some strategic management scholars like Ambrosini and Bowman (2009) to integrate dynamic capabilities with a number of related-complementary fields, notably, innovation as it contributes to reduce vagueness. It can also be used to reject claims in some empirical studies considering specific processes and strategies as dynamic capabilities, such as Karim and Mitchell (2000), that the acquisition strategies facilitate the reconfiguration of firms' resources, so that they should be considered as dynamic capabilities. Moreover, Danneels (2002) argued that the resource renewal stemmed from the high-tech firms' product innovation processes making these dynamic capabilities. The current research showed how dynamic capabilities are better understood as an agency in which *Alpha* actors drew on their understanding of the external structure of their firm and of their own roles (internal structure) to create,

reconfigure, leverage, coordinate, integrate and energize their respective resource base for initiating change, which was represented in the development of a new innovation project (vehicle protection bags). Therefore, they do not constitute the product innovation process itself; they are instead the agency that drives such process.

6.2.3 Contribution associated with conceptualizing “protective” and “destructive” as two types of innovative dynamic capabilities

The current research contributed to refining and extending the perspective of dynamic capabilities by theorizing two types of innovative dynamic capabilities, namely, protective and destructive capabilities. Although dynamic capabilities are characterized by the capacity to create change or adapt – for instance, Helfat, et al. (2007, p. 1) explained that dynamic capabilities are “the capacity of an organization to purposefully create, extend or modify its resource base” – no attempt has been made in the existing literature to link dynamic capabilities perspective with other perspectives that are characterized by the two aspects mentioned earlier, in order to clarify their impact. This current research is based on structuration theory, which mainly consists of the two aspects under focus (change and continuity) and then considered the integration of dynamic capabilities with innovation through the theories/perspectives of technology path (Hung, 2004), creative destruction (Schumpeter, 1934 & 1942) and persistence of innovative activities (Malerba, et al., 1997), in theorising the destructive and protective innovative dynamic capabilities. Such theorising contributed to advancing understanding of what has changed or what has continued in a specific structuration process of innovation development over time as a result of the effect of dynamic capabilities, as well as what drives and who the key players are behind the change or continuity. The findings of this research supported this theorizing as they provided empirical evidence of three

types of change that are associated with the *Alpha* project (change at the level of existing type of innovation, change at the level of existing social structure and change at the level of existing corporate agents) and resulting from the destructive dynamic capabilities of SHAMMA.

6.2.4 Contribution associated with conceptualizing “energizing slack resources” as a new process of dynamic capabilities

The current research contributed to refining and extending the perspective of dynamic capabilities by theorizing a further process of dynamic capabilities, which is the energizing of slack resources. Contrary to the previous research of dynamic capabilities that has mostly built on the ideas of Teece, et al. (1997), and which identified learning, reconfiguring, leveraging and coordinating and integrating as the four exclusive constituent processes of dynamic capabilities, this research has argued that energizing slack resources can be also a constituent part of firms’ dynamic capabilities, in the case of such firms possessing recoverable slack innovation-based resources within their resource base. This was done by showing how these firms’ innovativeness can be greatly accelerated when they manage to energize such resources, while planning for and implementing innovation development processes. This contribution is the first theoretical attempt to oppose the dominant viewpoint within the existing literature that underlines the exclusiveness of the processes of dynamic capabilities in only four elements (Teece, et al., 1997; Wang & Ahmed, 2007; Menon, 2008 and Ambrosini & Bowman, 2009). However, this current study is not limited to the theoretical extension; above all, it paves the way for those researchers who wish to examine closely what makes dynamic capabilities, as they have advanced knowledge that conceptualizes new processes of dynamic capabilities located outside the dominant conceptualization in the literature.

The existing literature has to some extent considered the relationship between organizational slack and innovation. However, bringing the two constructs into dynamic capabilities and understanding such relationship from a structuration perspective was almost neglected. Through emphasizing the social dimension of focal actors who directly engage in developing innovation projects, this research indicates that innovation projects that are hampered for reasons related to organizational slack can be revived by virtue of the social elements of communication, power and sanction that are associated with those actors. Therefore, energizing slack resources was suggested as a new process of dynamic capabilities.

Despite the fact that the conceptualization of energizing slack resources as a new conditional process of dynamic capabilities stems from a solid theoretical base (Sirmon & Hitt, 2003 and Chiu & Liaw, 2009) – that is, not to maintain aged, decaying and slack resources within the resource base of a firm which intends to build new dynamic capabilities or use existing ones – empirical evidence was needed to give more authenticity to such a claim. It is fortune that the *Alpha* case findings showed that at least three critical incidents (overlap of tasks, completing the protection bags for the first vehicle line's cars and turnover of *Alpha* members) would not have occurred without energizing crucially related resources that were slack at the time. This implies that the current research does not only support the theoretical claim of the significance of energizing slack resources while using dynamic capabilities, by theorising a new process of dynamic capabilities that is consistent with such a claim, it also empirically reinforced it by providing practical proofs.

6.3 Practical implications

In **Chapter Four and Chapter Five**, it was explained that the dynamic capabilities perspective, which has been under the microscope of scholars since 1990, should not be only considered a theoretical perspective; it should also be considered a practical one as its elements have a presence in practice. The practicality of dynamic capabilities is also supported by the fact that, while interviewing the research participants, I found that a number of them used to carry out some activities that could be classed within the existing conceptualization of dynamic capabilities without recognizing this or having prior knowledge about it. Therefore, the research findings and their conceptual frameworks (presented in **Chapter Two**) can be usefully used as tools to guide and inform individuals in the manufacturing industry and innovation development organizations with regard to the complementarity between the social structure and agency that occurs while using dynamic capabilities in innovation development processes. In spite of the drawbacks identified by Yin (2003) in adopting a single case study, this research can still present a certain group with vision and practical significance.

6.3.1 Implications for manufacturing firms involved in innovation development processes

Management at different levels can impact the use of dynamic capabilities; therefore, the next recommendations, which emerge from the insights of this research, are presented as a managerial guideline for three different groups of manufacturing firm individuals, who usually have distinct roles in innovation development processes. These groups are managers, planners and decision makers. The managers (representing the lower managerial level among the three groups) play critical roles in either improving an

existing innovation product/project or presenting and formulating a completely novel one; the planners (representing the medium managerial level among the three groups) are those whose role is to identify innovative concept opportunities and to discuss the mechanism in which the concept should be generated and then converted into a physical product; and the decision makers (representing the higher managerial level among the three groups) administer the entire unit that is responsible for innovation development processes/projects and have the authority to control their unit's resource base and expenditures. The implications associated with each group are explained below.

Managers (represented by **the body engineering quality manager** and ***Alpha* team leader** in the case of ***Alpha***) should be aware that the development of innovation projects, especially those projects that result in gaining an above-average value or solving a chronic problem is not only limited to what their firms possess in terms of innovation-based dynamic capabilities and technological expertise, it also decisively pertains to some impact factors that govern the use of these capabilities. They should realize the fact that they themselves are required either to activate or deactivate specific influence factors in order to initiate, proceed and finalize their promising innovation projects. Therefore, first, they should identify which structural factors (signification-related factors, domination-related factors and legitimation-related factors) that might facilitate or inhibit the optimal use of their firms' innovation dynamic capabilities while engaging in innovation projects, so that they can support the facilitating factors from their origins and suppress the inhibiting factors from their origins as well. They then should prioritize the facilitating factors based on their influence on the underlying innovation development process through identifying which of them is considered to be the pivotal motive of the

innovation dynamic capabilities in comparison with the rest, and thus identify how the most prioritized factors can be manipulated in accordance with the innovation development process. Finally, they should take into consideration the need to observe constantly the already supported influence factors and re-assess the already suppressed influence factors, while the innovation development process is moving forward, in order to make sure that the actual influence of each of these structural factors is identical to the one that was perceived earlier. A scorecard can be used in doing so. If it is not the case, the managers should re-support, re-inhibit, re-prioritize and re-manipulate the factors according to the monitored results.

Planners (represented by **the quality engineering director** and **SHAMMA's steering group** members in the case of *Alpha*) should thoroughly and proactively understand the magnitude of change that is expected to occur as a result of implementing the innovation development process/project under planning, and, above all, they must identify the time and resources required to attain the transformation from the existing innovation to the new one if such transformation is imperative. This research's framework that distinguishes between destructive and protective dynamic capabilities (presented in **Chapter Two**) can be adopted by these planners as an explanatory framework, which can aid them to understand better the change/transformation (in case of entirely new innovation) or modification (in case of amended innovation) associated with the implementation of the innovation project. Thus, they can match either that change or modification with the portfolio of their firms' existing innovation-based dynamic capabilities, so that they can decide whether the innovation project under planning can be attainable. The three-dimensional framework can guide their planning in three aspects:

the change/modification associated with the type of innovation, the change/modification associated with the social structure and the change/modification associated with the corporate agents. Therefore, their planning-related decisions can be further rationalised.

Decision makers (represented by **the quality director** in the case of *Alpha*) should understand that their firms' innovation-based dynamic capabilities could be differently exploited by the same means. This research's frameworks of explaining dynamic capabilities from a structuration perspective and the findings associated with it showed how the activities of dynamic capabilities can be differently utilized in the process of innovation development according to the nature of the process. So that the reconfiguring activities for instance carried out for a modified innovation should be different to those carried out for an entirely new one, which also applies to the other types of dynamic capabilities activities. They should also realize that an entirely new innovation process usually needs to be accurately sponsored by a bid that does not only bear the financial requirements of such a process, but also the removal of the existing organizational routines that are not consistent with it. Therefore, they can decide not to carry out the process if they fail to offer the appropriate bid for it. Moreover, this research's findings showed that human resource affects the innovation development process more than other resources, if its status is slack. These decision makers, especially if their firms are very structured, should attempt to adopt an "implementation readiness approach", by which people can be transferred between the firm's innovation-based units, so there can be some rotation between them. By having such rotation, the firm can keep people engaged in what each innovation-based unit needs; this is something that can provide some continuity.

6.4 Chapter summary

This chapter attempted to explain in detail the contributions to knowledge associated with the current research. By relying on the findings of the semi-longitudinal case developed in this research and the related theoretical frameworks, I explained how the perspective of dynamic capabilities can be extended by integrating it with a complementary field and investigating it from a structuration perspective. The fundamental contribution of this research was theorizing and empirically testing two types of innovation dynamic capabilities that are characterized different functionality and attributes. Other contributions regarding the significance of energizing slack resources while developing innovations as a process of dynamic capabilities and the intentionality factor associated with dynamic capabilities were confirmed by providing some practical proofs.

Chapter Seven: Conclusion

7.1 Summary of the research and its key findings

This research project has investigated how manufacturing firms combine their social structures and their actors' actions while utilizing dynamic capabilities in innovation development processes/projects. The exact aim of this research was:

“To comprehend the mechanism by which manufacturing firms use innovative dynamic capabilities to develop, maintain and destroy innovation processes/projects from a structuration perspective”.

The overall aim was addressed through the following two research questions:

- **How do manufacturing firms structurally develop, maintain and destroy innovation processes/projects through reliance on their innovative dynamic capabilities?**
- **What distinguishes the protective innovative dynamic capabilities of manufacturing firms from their destructive innovative dynamic capabilities?**

First, dynamic capabilities have been defined in this research as “the capacity of an organization to purposefully create, extend or modify its resource base” (Helfat, et al., 2007, p. 1). By considering external structure, internal structure and active agency as three elements of structuration theory, dynamic capabilities have been defined, from a structuration perspective, as **“an agency in which actors draw on their perception of the external structure of their firm and their own knowledge of their roles (internal structure) to create, reconfigure, leverage, coordinate, integrate and energize the resource base of their organization with the objective of initiating or adapting to**

change". An empirical study was then developed and set in the context of innovation projects developed by an auto-manufacturing firm to support empirically the theoretical accounts of this research's three academic perspectives/fields (dynamic capabilities, structuration and innovation). This led to addressing the two research questions as follows:

7.1.1 Research question 1: How do manufacturing firms structurally develop, maintain and destroy innovation processes/projects through the reliance on their innovative dynamic capabilities

In order to answer this research question, the existing definitions of dynamic capabilities were reviewed in detail. The definition of Helfat, et al. (2007) was adopted as it stresses the changeable status of the firms' resources base, which is compatible with the nature of dynamic capabilities as a force affecting that base. It is also relevant the intentionality factor emphasized in this definition. The adoption of such a definition was a starting point from which to address this research question. Subsequently, the structuration process approach was adopted (Giddens, 1976; 1979 and 1984; Chiasson & Saunders, 2005; Stones, 2005; Chell, 2008), which considers business entities as social structures whose actors' capability to act and generate flow of activities is determined by these structures' rules, which influence this capability by identifying the purposes, procedures and nature of interaction between actors and performance yardsticks. This is also determined by these structures' allocative and authoritative facilities, represented by the capability to control material phenomena and to control people. Hence, dynamic capabilities could be defined from a structuration perspective. This was followed by explaining the five processes of dynamic capabilities under consideration in this research from a structuration perspective. A step was taken to explain these processes from an

innovation perspective. The aim of explaining the processes from an innovation perspective first and then from a structuration one was to identify their roles in developing innovation processes/projects prior to identifying the impact of signification, domination and legitimation as structural influential factors on these roles. Consequently, answers could be provided to the research questions.

Building on the above, an empirical study was developed in the context of a certain automotive innovation project, *Alpha*. By integrating the materials of the empirical study with the theoretical accounts of this research, specific roles associated with the learning, reconfiguring, leveraging, coordinating and integrating and energizing activities that have been played by the respective actors for the sake of developing, extending and handing over the innovation project have been detected. The influence of signification, domination and legitimation on these roles has also been highlighted. As a consequence, the first research question has been answered through illustrating how *Alpha's* actors decided to rely on a specific active agency, which was represented by the different ways in which they used their social structure's facilities/resources according to specific "scripts" derived from that structure, and how they perceived their own roles based on these scripts to create dynamic capabilities-based actions that ultimately led to the development, extension and hand over of their project.

7.1.2 Research question 2: What distinguishes the protective innovative dynamic capabilities of manufacturing firms from their destructive innovative dynamic capabilities

The model of technology path introduced by Hung (2004) has been crucial in my attempt to answer the second research question. This model was particularly utilised to prove that any innovation development process/project is in fact a structuration process entailing

mutual interaction between actors' actions and social structure. However, such a model does not precisely identify whether these human innovation actions are similar in terms of their outcomes and impact. Therefore, two further perspective/theories, the theory of creative destruction (Schumpeter, 1934 & 1942) and the theory of persistence of innovative activities (Malerba, et al., 1997), were utilised with the purpose of identifying the types of actions that usually accompany innovation development processes/projects. The following innovation actions were identified and defined as a consequence: destructive and accumulative. They were then integrated with the perspective of dynamic capabilities in an attempt to identify two types of innovation-based dynamic capabilities. Accordingly, frameworks of destructive and protective innovative dynamic capabilities were developed, so that distinct functionality and attributes were attached to each type of dynamic capabilities.

By integrating the above with the findings of the *Alpha* case, it was revealed that the *Alpha* project was an outcome of destructive dynamic capabilities rather than protective dynamic capabilities, given that specific destructive changes at three different levels were a requirement to initiating, implementing and handing over the project. Meaning that the characteristics of destructive dynamic capabilities explained in the framework mentioned earlier could be applied to *Alpha* as an innovation project. By providing such practical evidence, the above research question was answered by proving how dynamic capabilities can be distinguished according to the nature and type of change or continuity they bring to the existing type of innovation, existing social structure and dominant corporate agents.

7.2 Limitations of the research

Each research project usually has its limitations and the current study is no exception. Efforts were made for the purpose of answering the research questions and attaining the overall aim, starting with a review of the previous literature within the perspectives/fields of dynamic capabilities, structuration and innovation, through the development of the related conceptual framework, and ending with the narrative analysis of the primary data generated while interviewing the research participants and matching the final findings with the theoretical accounts of the research. However, there were some specific limitations.

First, it is widely recognized that internal validity is a major concern for process research. The internal validity is associated with both the case under study and the analysis and it “refers to the degree to which results are ‘true’ for the particular place and moment in time to which they refer, at least to the participants in the process under investigation” (Sminia, 2009, p. 105). This research has managed to almost investigate the entire population of *Alpha*. However, this does not mean that every aspect of the process under investigation (the development of *Alpha*) was sufficiently covered. Examples of such not adequately covered aspects are the *Alpha* activities independently carried out by those who work at the three manufacturing plants of **SHAMMA**, given that the researcher’s ability to meet such people was restricted.

Second, this research considered a specific class of dynamic capabilities, namely, innovative dynamic capabilities. Consequently, the theoretical insights might be only relevant to those dynamic capabilities that fall within the scope of innovation, thus excluding those that belong to other classes of dynamic capabilities.

Third, given that the findings of this research are derived from a single case study within the scope of a certain industry (automotive), I might encounter some difficulties in analytically generalizing them outside the boundaries of that industry. Taking into consideration that such generality requires that any theoretical pattern should not be modified prior to be generalized (Poole et al. 2000). Indeed, some authors, such as Laamanen and Wallin (2009), argued that the capabilities developed and used in a specific context could not be developed and used in a different context. However, as other manufacturing industries such as electronics and machinery have similar characteristics in terms of dynamism to the automotive industry, the findings of this research can be to some extent applied to them.

Fourth, theoretically, two types of innovative dynamic capabilities (destructive and protective) have been suggested in the current research. However, due to time and accessibility restrictions, the empirical focus of this research has only been directed towards the destructive type in the *Alpha* case study. The inability to combine the *Alpha* case with a comparable case that represents the protective type prevents this research from considering the two types from an empirical point of view through providing more practical evidence that explains the impact of the dynamic capabilities associated with each type on the dominant innovation, the social structure and the corporate agents of the two cases.

Fifth, as it was explained in **Chapter Three**, some of the 15 interviews conducted with the informants were by telephone due to their professional commitments and busy schedule. Such data generation method has enabled me to listen to what these informants

have to say; however, it has restricted the ability to recognize what exists beyond their explanations of a specific critical incident as well as their physical gestures. This was significant given the vague nature of the theoretical perspectives of this research, particularly, dynamic capabilities.

Sixth, in spite of the fact that this research, through its four-dimensional coding, narrative analysis and semi-longitudinal case study, managed to support its theoretical insights, thus, achieving its overall aim, its findings were limited to the structuration-based explanations provided by its participants regarding the conditions, actors and outcomes of the critical incidents which took place during the life of the case under investigation. This implies that the researcher's ability to record in field observations how these incidents actually occurred was restricted owing to institutional considerations. However, this constraint is always experienced in process research (Giddens, 1984).

7.3 Future research implications

This section explains how researchers on the perspective of dynamic capabilities can rely on the theoretical insights and the practical outcomes of the current research project for future research opportunities. First, opportunities regarding the theoretical accounts developed in this research are identified, so further extension and refinement of the perspective of dynamic capabilities can be attained. Second, empirical opportunities are also identified, so that future research can investigate dynamic capabilities beyond the empirical scope of this research. Third, methodological opportunities are taken into consideration, which enables future researchers to adopt further methodological approaches while investigating dynamic capabilities.

7.3.1 Implications associated with the theoretical accounts

By adopting the perspective of structuration (Giddens, 1976; 1979 and 1984; Chiasson & Saunders, 2005; Stones, 2005; Chell, 2008), the current research has investigated how dynamic capabilities are internally used through explaining the social processes that drive the learning, reconfiguring, leveraging, coordinating and integrating and energizing activities implemented in innovation development projects. Future research can adopt the same perspective, but concentrate on how dynamic capabilities are externally developed and used by exceeding the individual-based social processes that internally drive innovations, and closely investigating the institutional-based social processes that emerge between the actors of two or more firms while developing innovations. This can provide some explanations and empirical evidence of how dynamic capabilities can be placed and used outside the boundaries of a specific firm. Future research can also adopt the same perspective with regard to the microfoundations of dynamic capabilities. Teece (2007) called these tacit elements sensing, seizing and reconfiguring and classified them as microfoundations of dynamic capabilities. Ambrosini and Bowman (2009) considered these factors as microfoundations of dynamic capabilities rather than dynamic capabilities themselves. Teece (2007, p.1321) defined the microfoundations of dynamic capabilities as “the organizational and managerial processes, procedures, systems, and structures that undergird each class of capability, and the capability itself”. Thus, microfoundations of dynamic capabilities can be seen as managerial and organisational processes that enable the exploitation of dynamic capabilities. Researchers can rely on the same structuration perspective adopted in this research to investigate the use of dynamic capabilities in developing innovation projects, but in investigating the use of the exploiters (microfoundations) of dynamic capabilities for the same purpose. Moreover, in

response to the increasing calls being made to reduce further the ambiguity of the perspective of dynamic capabilities by examining it within a complementary field, researchers should take advantage of the current study's attempt to integrate dynamic capabilities with innovation by undertaking structural dynamic capabilities research within further complementary fields. Therefore, providing structuration-based explanations about the development and use of dynamic capabilities in the context of merger and acquisitions, organizational change and entrepreneurship are recommended for future research.

7.3.2 Empirical implications

The current study has theoretically established the basis for researchers interested in the areas of dynamic capabilities, structuration and innovation to examine empirically not only how manufacturing firms destroy their existing innovation projects, social structures and corporate agents through the reliance on dynamic capabilities, but also how they defend them by undertaking comparative empirical studies that simultaneously investigate the role of destructive dynamic capabilities in developing new innovations and the role of protective dynamic capabilities in defending existing innovations within the context of two different units of analysis. Moreover, as the current research has focused empirically on one industry, which is the automotive industry, researchers should consider the possibility of applying its theoretical insights to a wider scope of industries. In this way, ideas can be generalized beyond a single industry.

7.3.3 Methodological implications

The data generation methods adopted in this research have supported the theoretical insights of the research. However, they were limited to the participants' experiences,

reflections and recollections about specific critical incidents and the researcher's interpretations of these recollections and experiences. Therefore, future research should closely investigate how participants utilize destructive and protective dynamic capabilities while developing or defending innovation projects in real conditions. This can be achieved by undertaking field studies within the same context in which specific critical incidents related to these projects take place.

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Appendixes

Appendix 1: Differences and intersections between variance and process research approaches

		Ontology An organization is represented as being:	
		A noun, a social actor, A real entity (“thing”)	A verb, a process of organizing, emergent flux
Epistemology (Method for studying change)	Variance method	Approach I Variance studies of change in organizational entities by causal analysis of independent variables that explain change in entity (dependent variable)?	Approach IV Variance studies of organizing by dynamic modeling of agent-based models or chaotic complex adaptive systems
	Process Narratives	Approach II Process studies of change in organizational entities narrating sequence of events, stages or cycles of change in the development of an entity	Approach III Process studies of organizing by narrating emergent actions and activities by which collective endeavors unfold

Source: Van de Ven & Poole 2005 (2005)

Appendix 2: The entire coding of *Alpha's* critical incidents

Critical incident 1: The planning of developing a project for innovative vehicle protection bags	
Efficient cause	<ul style="list-style-type: none"> - Successive meetings were held at the level of senior management and were chaired by the quality engineering director for the sake of examining the feasibility of developing innovative vehicle protection bags. - The senior management and the vehicle quality team in particular were directly involved in such meetings. - The quality engineering director was more critical in specific due to his massive knowledgeability and due to the fact that he was the person who identified the features of the bags, devised the quality procedures, reviewed the quality specifications of the design and identified what is the verification the project has to do and what is the validation the project has to do.
Formal cause	<p>The incident can be taken place through:</p> <ul style="list-style-type: none"> - Holding multiple meetings within the vehicle quality team to firstly discuss the feasibility of developing a new project to innovate vehicle protection bags and secondly discuss the development plan of the project. - Outsourcing the whole project including the planning part of it to an outside provider. - Relying on a think tank to discuss the mechanism in which the project should be conducted and discuss its feasibility. <p>- Holding multiple meetings within the senior management level including the vehicle quality team to firstly discuss the feasibility of developing a new project to innovate vehicle protection bags and secondly discuss the development plan of the project.</p> <p>The incident actually took place as it was mentioned in the last point above.</p>
	<p>Two motives were there for the incident to happen:</p> <ul style="list-style-type: none"> - Cutting down the warranty costs that result from the exposure of the vehicle's surface to damages while transporting it to the dealers across the globe.

Final cause	- Increase the pride value as well as, improve the customer perception through producing a more quality product.
Material cause	<p>The ingredients were required for the incident to occur:</p> <ul style="list-style-type: none"> - A specific person or team was required to calculate how much the firm is going to spend on the warranty? How much the firm currently spending on the warranty? How can the firm reduce it? How much the firm will economize warranty costs by developing such a project. - Calculating the budget needed for the project. - Identifying the number of personnel, teams and suppliers needed to engage in the project. <p>The vehicle quality team led by the quality engineering director was accountable for such planning tasks.</p>

Casual coding of the first critical incident

Critical incident 1: The planning of developing innovative vehicle protection bags' project	
Time	Beginning of 2012
Place	The firm's Headquarter in England.

Contextual coding of the first critical incident

Critical incident 1: The planning of developing innovative vehicle protection bags' project	
Efficient cause	<p>The successive meetings in the planning stage resulted in:</p> <ul style="list-style-type: none"> - A specific team made up of four members was created to take responsibility for the project of developing innovate vehicle protection bags. (Input/output relationship) - Identifying the 25th of June 2012 as the first day of the project and identifying February-April 2013 as the potential time to terminate the project. (Input/output relationship) - The initial expenditure of the project was set to be £4 million. (Input/output relationship)

	<ul style="list-style-type: none"> - The team responsible for managing the project demanded re-reviewing the financial resources needed to fund the project and the time frame identified to execute the project. (Feedback relationship)
Formal cause	None
Final cause	<ul style="list-style-type: none"> - The collaboration with the purchases department to review the profiles of the potential suppliers was necessary to start the development stage in the appointed time. (Input/output relationship) - Internal communication with the related departments such as the manufacturing team and the paint team was necessary to draw the skeleton outline of required collaboration. (Input/output relationship)
Material cause	<p>The successive meetings in the planning stage affected the requirements for the development stage as follows:</p> <ul style="list-style-type: none"> - Three manufacturing plants in England were needed to host the development activities of the project. (Input/output relationship) - Technical and environmental legislations and instructions were emphasized at the beginning of the development stage. (Input/output relationship) - Successive meetings were scheduled between the team responsible for the project and the steering group in the firm to discuss the progress of the project. (Input/output relationship)

Relational coding of the first critical incident

Critical incident 2: The start of developing the innovative vehicle protection bags' project	
Efficient cause	<ul style="list-style-type: none"> - The four members who made up the team responsible for managing the project were informed about their individual roles and the associated safety and institutional instructions by the body engineering quality manager. - The team leader attended a steering group meeting in which he delivered the assertions of the senior management, in particular, the quality engineering director to the rest of the team. - Identifying the fundamental characteristics of the bags' design and the bags' standard. - Agreeing a contract with one supplier.

	<ul style="list-style-type: none"> - The four members of the team, the body engineering quality manager and the steering group were all involved in this accident. - The body engineering quality manager was more critical in specific due to the fact that he was the person who identified the different shapes of the vehicles' bags as each vehicle might have five to six variants.
Formal cause	<p>The incident can be taken place through:</p> <ul style="list-style-type: none"> - Holding a sole meeting chaired by the team leader to inform the rest of the team about their individual roles and associated technical and environmental legislations without a direct involvement of the body engineering quality manager and the senior management. - Holding an induction meeting chaired by the body engineering quality manager to inform the team's members about their individual roles and associated technical and environmental legislations without a direct involvement of the senior management, represented in the steering group. - Holding an induction meeting chaired by the body engineering quality manager to inform the team's members about their individual roles and associated technical and environmental legislations in addition to a direct involvement of the senior management, represented in the steering group. <p>The incident actually took place as it was mentioned in the last point above.</p>
Final cause	<p>One vital motive was there for the incident to happen:</p> <ul style="list-style-type: none"> - Being somewhat a part of a 36 months development cycle which is the global product development cycle made it imperative for the project to start its development activities in order to meet the time speed of the firm's production, which means that any vehicle should be coming out of the line with a bag on it without any delay.
Material cause	<p>The ingredients were required for the incident to occur:</p> <ul style="list-style-type: none"> - A specific facility was harnessed for the team to meet and exercise its activities in the firm's headquarter in England. - Financial resources were there to fund the project's activities and cover the costs of contracting with a supplier.

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Casual coding of the second critical incident

Critical incident 2: The start of developing the innovative vehicle protection bags' project	
Time	The 25 th of June 2012
Place	The firm's Headquarter in England.

Contextual coding of the second critical incident

Critical incident 2: The start of developing the innovative vehicle protection bags' project	
Efficient cause	<ul style="list-style-type: none"> - One supplier arrived at beginning of July 2012 as a consequence of this incident. (Input/output relationship) - Three of the team's members were asked to work in three manufacturing plants in England to develop the bags of different vehicle lines' cars, starting from the second week of July 2012 as consequence of this incident. (Input/output relationship) - The team started to develop the standards document of the bags in July 2012 as consequence of this incident. (Input/output relationship)
Formal cause	None
Final cause	<ul style="list-style-type: none"> - The instant existence of the supplier was important in order to take the measurements necessary for starting the design process of the bags later on. (Input/output relationship) - The meeting with the body engineering quality manager was important to understand the fundamentals of developing the standard of the bags later on. (Input/output relationship)
Material cause	<p>The initial activities in the development stage affected the requirements for sending three of the team's members to work in three different manufacturing plants In July 2012 as follows:</p> <p>Initial contacts occurred between the team leader and the managers of the three plants to explain the potential roles of the three members in the respective plants. (Input/output relationship)</p>

Relational coding of the second critical incident

Critical incident 3: The coming of the first supplier	
Efficient cause	<ul style="list-style-type: none"> - Taking the measurements necessary for the bags' design of the first vehicle line's cars at the firm's first manufacturing plant in West Central England. - Starting the development of the prototype bag version for the first vehicle line's cars prior to developing their production bags. - The purchases department was critical as it was funding the costs of the supplier's contract. The team leader was also critical as he was reviewing and evaluating the supplier's capabilities and performance. The rest of the team's members were also critical as they were managing the relationship with the supplier based upon availability.
Formal cause	<p>The incident can be taken place through:</p> <ul style="list-style-type: none"> - The supplier could be fully committed to work at the project's place. - The supplier came to the project's place intermittently based upon scheduled visits. <p>The incident actually took place as it was mentioned in the last point above.</p>
Final cause	<p>Two motives were there for the incident to happen:</p> <ul style="list-style-type: none"> - The necessity of developing the prototype bag for the first vehicle line's cars that was assembled at the firm's first manufacturing plant in West Central England and amending any design errors prior to developing the accredited version of them. - The exploitation of the supplier's specific know-how in the design aspect of the bags development, which is out of the firm's boundaries.
Material cause	<p>The ingredients were required for the incident to occur:</p> <ul style="list-style-type: none"> - The presence of the three project engineers of the team to alternately track the supplier's work and also for understanding and explaining purposes. - Providing the materials required for developing the prototype bag and executing the design process.

	<ul style="list-style-type: none"> - Allowing the supplier to access the manufacturing plant where the bags were developed. <p>Receiving the supplier's "minutes" that summarise the supplier's work and explain which modifications should be executed next time.</p>
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Casual coding of the third critical incident

Critical incident 3: The coming of the first supplier	
Time	The beginning of July 2012
Place	The firm's first manufacturing plant in West Central England (where the bags of the first vehicle line's cars were developed).

Contextual coding of the third critical incident

Critical incident 3: The coming of the first supplier	
Efficient cause	<ul style="list-style-type: none"> - The inability of the first supplier to entirely manage the bags' design process for all the different vehicle lines urged the firm to contract with two other suppliers in September 2012. (Input/output relationship) - The team leader's evaluation of the first supplier's performance resulted in extending the supplier's contract to work on the same vehicle line's cars for another year. (Feedback relationship)
Formal cause	<ul style="list-style-type: none"> - The team changed the way in which it was working with its suppliers to not disclose the firm's specific know-how. (Feedback relationship)
Final cause	<ul style="list-style-type: none"> - Developing bags for multiple vehicle lines' cars in three different sites encouraged the contracting with further suppliers. (Input/output relationship)
Material cause	<p>The detection of the need for bringing in more suppliers affected the requirements for contracting with two further suppliers in September 2012 as follows:</p> <ul style="list-style-type: none"> - More financial recourses were required for funding the costs of contracting with new suppliers. (Input/output relationship) - A new work distribution was created to distribute the workload among the three suppliers (one is existing and two are new). (Input/output relationship)

	relationship) - More financial recourses were required for funding the costs of extending the contract of the first supplier. (Feedback relationship)
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Relational coding of the third critical incident

Critical incident 4: The beginning of developing the standards document of the bags and working on developing the bags for the first vehicle line's cars.	
Efficient cause	<ul style="list-style-type: none"> - The whole team in cooperation with the body engineering quality manager started the development of the bags' standard. - All the team's members pulled together to work on developing the bag for only one vehicle line's cars that are produced at the firm's first plant in West Central England. - The team leader was more critical here as he was the only person that technically guided the team in developing the bags' standard based on the instructions of the body engineering quality manager at that time.
Formal cause	<p>The incident can be taken place through:</p> <ul style="list-style-type: none"> - The team's members could independently develop the standards document of the bags. - Each member could be given a specific part of the standards document of the bags to work on it. - The whole team simultaneously develop the all parts of the standards document of the bags. <p>The incident actually took place as it was mentioned in the last point above.</p>
Final cause	<p>Two motives were there for the incident to happen:</p> <ul style="list-style-type: none"> - Developing protection bags for 12 different car models required developing a document that describes the materials in which the bags should be made up of, the design of that materials, the design of the complete vehicle bags and the way in which the bags should be used across the 12 car models of the firm. - Concentrating on developing a bag for only one vehicle line's cars at the beginning was due to the fact that that vehicle line was the new flagship model of the firm at that time.
	The ingredients were required for the incident to occur:

Material cause	<ul style="list-style-type: none"> - Specific assertions were emphasized by the team leader to explain the way in which the standards document should be developed. However, they were not sufficient. - The team's members looked at some existing standards documents to enhance their knowledgeability in developing the bags' standard.
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Casual coding of the fourth critical incident

Critical incident 4: The beginning of developing the standards document of the bags and working on developing the bags of the first vehicle line's cars.	
Time	The beginning of July 2012
Place	<ul style="list-style-type: none"> - The firm's principal engineering center in West Central England (Where the standards document of the bags was developed) - The firm's first manufacturing plant in West Central England (Where the bags of the first vehicle line's cars were developed).

Contextual coding of the fourth critical incident

Critical incident 4: The beginning of developing the standards document of the bags and working on developing the bag of the first vehicle line's cars.	
Efficient cause	<ul style="list-style-type: none"> - The team's tasks started to grow in nature and number as a result of working on developing the standard of the bags. (Input/output relationship) - The approvers' evaluation of the bags' standard resulted in amending the standards. (Feedback relationship)
Formal cause	- The approvers' evaluation of the bags' standard resulted in changing the way in which it should be developed and maximized the efforts to finalize it. (Feedback relationship)
Final cause	- Making some amendments to the bags' standard was necessary prior to final submission. (Input/output relationship)
	<p>The detection of the difficulty of developing the bags' standard affected the requirements for amending it as follows:</p> <p>More importance and time given to the bags' standard. (Input/output</p>

Material cause	relationship)
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Relational coding of the fourth critical incident

Critical incident 5: Working on developing bags for different vehicle lines' cars at different plants	
Efficient cause	<ul style="list-style-type: none"> - Bilateral contacts between the team leader and the managers of the three plants (the managers of the plants vehicle teams) occurred to ease the access of the three-team members into the plants (two plants are in West Central England and one is in North West England). - Each member was required to introduce himself to each subordinate working in his respective plant and explain the task he was assigned for in that plant to him. - The three project engineers of the team were more critical here as they spent a large amount of time at the plants to develop the bags and they exerted great efforts to enhance the knowledgeability of the plants' operators about the bags development.
Formal cause	<p>The incident can be taken place through:</p> <ul style="list-style-type: none"> - Each member could spend the whole week in his respective plant. - Each member could visit his respective plant twice a week. - Each member visited his respective plant once a week. <p>The incident actually took place as it was mentioned in the last point above.</p>
Final cause	<p>Two motives were there for the incident to happen:</p> <ul style="list-style-type: none"> - The necessity of developing protection bags for 12 different vehicle cars prompted the allocation of one member to work on each plant where these cars were assembled. - Different-sized cars were assembled at each plant so that each member was asked to work differently in order to develop bags with different sizes.
Material cause	<p>The ingredients were required for the incident to occur:</p> <ul style="list-style-type: none"> - Providing the information pertaining to each plant to the three-team members. (Location, access, etc....) - Finding the right point of contact at each plant (manager of the plant

	<p>vehicle team)</p> <p>- Providing the necessary information about the task assigned to each member to those operators and subordinates working at each plant.</p>
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Casual coding of the fifth critical incident

Critical incident 5: Working on developing bags for different vehicle lines' cars at different plants	
Time	The second week of July 2012
Place	The firm's first and second manufacturing plants in West Central England and the firm's manufacturing plant in North West England.

Contextual coding of the fifth critical incident

Critical incident 5: Working on developing bags for different vehicle lines' cars at different plants	
Efficient cause	- Two further suppliers were needed to be allocated for the bags development at the firm's second manufacturing plant in West Central England and the firm's plant in North West England. (Input/output relationship)
Formal cause	- The three members' evaluation of the plants' insufficient cognition of their tasks and the development of the bags resulted in each member was provided with a "line pull document" in which he could be authorized enough to perform his tasks inside his respective plant. (Feedback relationship)
Final cause	- Developing different bags for different vehicle lines' cars at different places rather than concentrating on developing bags for only one vehicle line's cars urged the firm to speed up the contracting with further suppliers. (Input/output relationship)
Material cause	<p>- The detection of the need for bringing in more suppliers as a result of developing bags for different vehicle lines' cars at different manufacturing plants, affected the requirements for contracting with two further suppliers in September 2012 as follows:</p> <p>- More financial recourses were required for funding the costs of contracting with new suppliers. (Input/output relationship)</p> <p>- A new work distribution was created to distribute the workload among the three suppliers (one is existing, two are new). (Input/output relationship)</p>

	relationship)
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Relational coding of the fifth critical incident

Critical incident 6: The coming of the second and the third suppliers

Efficient cause	<ul style="list-style-type: none"> - The new two suppliers received an order to work at the firm's second manufacturing plant in West Central England and the firm's manufacturing plant in North West England as the existing supplier was working at the firm's first manufacturing plant in West Central England. - Taking the measurements necessary for the bags' design of the vehicle lines' cars assembled at the firm's second manufacturing plant in West Central England and the firm's manufacturing plant in North West England. - Starting the development of the prototype bags prior to developing the production bags for the vehicle lines' cars assembled at the firm's second manufacturing plant in West Central England and the firm's manufacturing plant in North West England. - The purchases department was critical as it was funding the costs of the suppliers' contracts. The team leader was also critical as he was reviewing and evaluating the new suppliers' capabilities and performance. The rest of the team's members, in particular the one working at the firm's second manufacturing plant in West Central England and the one working at the firm's manufacturing plant in North West England were also critical as they were managing the relationship with the new suppliers.
Formal cause	<p>The incident can be taken place through:</p> <ul style="list-style-type: none"> - The suppliers could be fully committed to work at the project's place. - The suppliers came to the project's place intermittently based upon scheduled visits. <p>The incident actually took place as it was mentioned in the last point above.</p>
Final cause	<p>Two motives were there for the incident to happen:</p> <ul style="list-style-type: none"> - The necessity of developing the prototype bag version for the vehicle lines' cars assembled at the firm's second manufacturing plant in West Central England and the firm's manufacturing plant in North West England and amending any design errors prior to developing the accredited version of them.

	<ul style="list-style-type: none"> - The exploitation of the suppliers' specific know-how in the design aspect of the bags' development, which is out of the firm's boundaries.
Material cause	<p>The ingredients were required for the incident to occur:</p> <ul style="list-style-type: none"> - The presence of two of the team's project engineers to track the suppliers' work and also for understanding and explaining purposes. - Providing the materials required for developing the prototype bags and executing the design process of the bags for the vehicle lines' cars assembled at the firm's second manufacturing plant in West Central England and the firm's manufacturing plant in North West England. - Allowing the suppliers to access the manufacturing plant/s where the bags were developed. - Receiving the suppliers' "minutes" that summarise the suppliers' work and explain which modifications should be executed next time.

Casual coding of the sixth critical incident

Critical incident 6: The coming of the second and the third suppliers	
Time	September 2012
Place	The firm's second manufacturing plant in West Central England and the firm's manufacturing plant in North West England.

Contextual coding of the sixth critical incident

Critical incident 6: The coming of the second and the third suppliers	
Efficient cause	<ul style="list-style-type: none"> - Working with three different suppliers in geographically different locations and developing the standard of the bags at the same time resulted in increasing the team's tasks in nature and number. (Input/output relationship) - The team leader's evaluation of the new suppliers' performances resulted in extending the second and the third suppliers' contracts to another year. (Feedback relationship)

Formal cause	None
Final cause	- Extending the project's time encouraged the extension of the suppliers' contracts. (Feedback relationship)
Material cause	Extending the second and the third suppliers' contracts affected the requirements for this incident to occur: More financial recourses were required for funding the costs of extending the second and the third suppliers' contracts. (Feedback relationship)

Relational coding of the sixth critical incident

Critical incident 7: The increase of the team's tasks in number and nature	
Efficient cause	<ul style="list-style-type: none"> - The continuation in developing the bags' standard. - Working with three different suppliers in three different sites to develop bags for 12 different car models. - The three project engineers of the team were critical as they were accompanying the suppliers in their visits to the three manufacturing plants. The suppliers themselves were critical due to their frequent visits to the manufacturing plants for trials and amendments purposes.
Formal cause	<p>The incident can be taken place through:</p> <ul style="list-style-type: none"> - The team's members could work on developing the standards document of the bags first prior to working with the three suppliers. - The team's members worked on developing the standards document of the bags and working with three suppliers simultaneously. <p>The incident actually took place as it was mentioned in the last point above.</p>
Final cause	<p>Two motives were there for the incident to happen:</p> <ul style="list-style-type: none"> - The team's members started to perceive their work differently as they started to realize how much time and efforts they need to write the standard of the bags. - Fractionating the collective efforts as a result of working with three different suppliers instead of concentrating them towards only one

	supplier resulted in some difficulties.
Material cause	<p>The ingredients were required for the incident to occur:</p> <ul style="list-style-type: none"> - Accompanying the three suppliers to the respective manufacturing plants. - Providing the materials required by the suppliers to make the necessary trials and amendments. - Receiving the suppliers' "minutes" that summarise the suppliers' work and explain which modifications should be executed next time.

Casual coding of the seventh critical incident

Critical incident 7: The increase of the team's tasks in number and nature	
Time	September 2012
Place	<ul style="list-style-type: none"> - The firm's principal engineering center in West Central England. (Where the standards document of the bags was developed) - The firm's first and second manufacturing plants in West Central England and the firm's manufacturing plant in North West England.

Contextual coding of the seventh critical incident

Critical incident 7: The increase of the team's tasks in number and nature	
Efficient cause	<ul style="list-style-type: none"> - Further suppliers' visits were scheduled due to the continuation of developing the bags for 12 different vehicle cars. (Input/output relationship) - The detection of the need to review more existing quality data in order to develop the bags' standard. (Feedback relationship)
Formal cause	None
Final cause	- Approaching "the show car" event that took place in October 2012 encouraged the team to speed up their progress in order to be in a good shape when the reviewers come to look at the bags. (Feedback relationship)
	The need for reviewing more quality data in order to develop the bags' standards affected the requirements for this incident to occur:

Material cause	<ul style="list-style-type: none"> - More quality existing standards were required to be reviewed prior to persisting the development of the bags' standard. (Feedback relationship) - More data regarding the materials' specifications were required to be reviewed prior to persisting the development of the bags' standard. (Feedback relationship)
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Relational coding of the seventh critical incident

Critical incident 8: Experiencing the recyclability restriction	
Efficient cause	<ul style="list-style-type: none"> - The use of some materials that cannot be reused. - The three project engineers of the team were critical as they were the ones who directly dealt with the non-recyclable materials and the suppliers were also critical as they were the ones who supplied such materials.
Formal cause	<p>The incident can be taken place through:</p> <ul style="list-style-type: none"> - The team's members could be fully aware of such restriction in advance. - The team's members recognized such restriction in an advanced stage of the bags development as the amount of the materials necessary to develop the bags increased. <p>The incident actually took place as it was mentioned in the last point above.</p>
Final cause	<p>The use of such non-recyclable materials was imperative to develop the bags, as there were no proper alternatives at that time.</p>
Material cause	<p>The ingredients were required for the incident to occur:</p> <ul style="list-style-type: none"> - The different necessary "non-recyclable" materials that are supplied by the suppliers for developing the bags. - The large amount of landfill materials that resulted from using the above materials.

Casual coding of the eighth critical incident

Critical incident 8: Experiencing the recyclability restriction	
Time	End of September 2012
Place	The firm's first and second manufacturing plants in West Central England and the firm's manufacturing plant in North West England.

Contextual coding of the eighth critical incident

Critical incident 8: Experiencing the recyclability restriction	
Efficient cause	The use of diverse materials (Non-recyclable and recyclable) in which the team could recycle a large portion of the used materials. (Feedback relationship)
Formal cause	The team paid more attention to the firm's ornamental (environmental) principles. (Feedback relationship)
Final cause	The evaluation of the materials used in the bags development and the decision to diversify such materials was driven by the necessity of not exceeding the percentage of the landfill materials that the firm's ethics and principles identify. (Feedback relationship)
Material cause	<p>The evaluation of the accident's outcome affected the ingredients required for the incident to occur as follows:</p> <ul style="list-style-type: none"> - The different necessary "non-recyclable" and "recyclable" materials that are supplied by the suppliers for developing the bags. (Feedback relationship) - The limited amount of landfill materials that resulted from using the above materials. (Feedback relationship)

Relational coding of the eighth critical incident

Critical incident 9: The "show car" event	
Efficient cause	<ul style="list-style-type: none"> -The presence of all the senior management members who were involved in this project to appraise the initial version of the bags. - Necessary explanations about the displayed bags were given by the team's members to the senior management. - Feedback was given by the senior management to the team's members. - The three project engineers of the team were critical as they were the

	ones who displayed the bags and delivered the required information to the senior management members. The senior management members were also critical as they were the ones who assessed the displayed bags.
Formal cause	<p>The incident can be taken place through:</p> <ul style="list-style-type: none"> - The “show car” event could be taken place in the attendance of the team leader only. - The “show car” event took place in the attendance of the team leader and the rest of the team. <p>The incident actually took place as it was mentioned in the last point above.</p>
Final cause	<p>Three motives were there for the incident to happen:</p> <ul style="list-style-type: none"> - The necessity of appraising the current state of the bags development at that time. - Detecting the errors and the limitations of the displayed bags. - Providing the bags’ developers with the necessary guidance to address the errors.
Material cause	<p>The ingredients were required for the incident to occur:</p> <ul style="list-style-type: none"> - Providing all the required protection items: the seat protection, the console protection, the steering wheel protection and the other protection items that are necessary for developing the bags. - “Minutes” were required to codify the feedback of the senior management on the displayed bags.

Casual coding of the ninth critical incident

Critical incident 9: The “show car” event	
Time	October 2012
Place	A display hall within the firm’s premises in West Central England.

Contextual coding of the ninth critical incident

Critical incident 9: The “show car” event	
Efficient cause	The diverse feedback received during the “show car” event resulted in amending the standards document of the bags and accelerating the pace to finalise it. (Input/output relationship)
Formal cause	The team further increased the time and efforts harnessed to develop and amend the standard of the bags. (Input/output relationship)
Final cause	Speeding up the process of amending the standards document of the bags was driven by the necessity of having a reference point that can address each issue raised by the senior management about the bags development. (Input/output relationship)
Material cause	The accident’s outcome affected the ingredients required for amending the bags’ standard as follows: The team was in need for further direct guidance from the body engineering quality manager and the other approvers in order to amend the bags’ standard in a short time frame. (Input/output relationship)

Relational coding of the ninth critical incident

Critical incident 10: The final amendments of the bags' standard	
Efficient cause	<ul style="list-style-type: none"> - Reviewing and analysing the feedback received during the “show car” event. - Providing the body engineering quality manager with a synopsis of the recently made amendments on the bags’ standards document. - Updating the amendments made on the standards document of the bags in the respective system (S-Dot. System). - The three project engineers of the team were critical as they were the ones who worked on amending the standard of the bags. The body engineering quality manager was also critical as he was reviewing the recently made amendments. The approvers and other reviewers were also critical as they were the ones who judged the standards document of the bags when it was inserted into the “S-Dot. System”.
	<p>The incident can be taken place through:</p> <ul style="list-style-type: none"> - The body engineering quality manager as one of the approvers who were judging the standards document of the bags, could only review the recently made amendments of the standards document after they were

Formal cause	<p>inserted into the “S-Dot. System”.</p> <p>- The body engineering quality manager as one of the approvers who were judging the standards document of the bags, reviewed the recently made amendments of the standards document before they were inserted into the “S-Dot. System”.</p> <p>The incident actually took place as it was mentioned in the last point above.</p>
Final cause	<p>The final amendments of the bags’ standard were driven by the willingness of the team as a whole and the body engineering quality manager to not receiving conflicting and diverse opinions from the different teams/departments that were engaged in this project on the bags development, they were instead determined to finalize the standard for the sake of having a document that can define everything and prevent others from raising conflicting opinions on the development of the bags.</p>
Material cause	<p>The ingredients were required for the incident to occur:</p> <ul style="list-style-type: none"> - A detailed summary of the feedback received during the “show car” event. - A Preliminary copy of the recently made amendments of the bags’ standard sent to the body engineering quality manager. - A final copy of the reviewed amendments of the bags’ standard was updated in the “S-Dot. System”.

Casual coding of the tenth critical incident

Critical incident 10: The final amendments of the bags' standards	
Time	End of October - November 2012.
Place	- The firm’s principal engineering center in West Central England. (Where the standards document of the bags was developed)

Contextual coding of the tenth critical incident

Critical incident 10: The final amendments of the bags' standards	
Efficient cause	The final amendments of the bags' standards document resulted in the final submission and accreditation of it in the end of November 2012. (Input/output relationship)
Formal cause	None
Final cause	The outcome of the final amendments of the bags' standards document encouraged the team to take a further step and submit the final version of it in the end of November 2012. (Input/output relationship)
Material cause	<p>The accident's outcome affected the ingredients required for submitting the final version of the bags' standard as follows:</p> <p>The team was in need for further direct guidance from the body engineering quality manager and the other approvers for submitting the final version of the bags' standards document. (Input/output relationship)</p>

Relational coding of the tenth critical incident

Critical incident 11: The final submission of the bags' standard	
Efficient cause	<ul style="list-style-type: none"> - Inserting the final version of the bags' standards document into the S-Dot. System. - The specialized approvers reviewed the inserted version of the bags' standards document and accepted it. - The three project engineers of the team were critical as they were the ones who inserted the final version of the standards document of the bags into the S-Dot. System. The approvers including the body engineering quality manager were also critical as they were the ones who accredited and accepted the final version of the bags' standards document.
Formal cause	There were no different ways for the incident to occur
Final cause	The final submission of the bags' standards document were driven by the willingness of the team as a whole and the body engineering quality manager to not receiving conflicting and diverse opinions from the different teams/departments that were engaged in this project on the bags development, they were instead determined to finalize the standard for the sake of having a document that can define everything and prevent others from raising conflicting opinions on the development of the bags.

Material cause	<p>The ingredients were required for the incident to occur:</p> <ul style="list-style-type: none"> - A final amended version of the bags' standards document. - An accreditation statement of the inserted final version of the bags' standards document.
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Casual coding of the eleventh critical incident

Critical incident 11: The final submission of the bags' standard	
Time	End of November 2012.
Place	The firm's principal engineering center in West Central England. (Where the standards document of the bags was developed)

Contextual coding of the eleventh critical incident

Critical incident 11: The final submission of the bags' standard	
Efficient cause	The final submission of the bags' standards document resulted in completing the bag for the first vehicle line's cars in February 2013. (Input/output relationship)
Formal cause	The team turned its focus into finalizing the development of the bag of the first vehicle line's cars as a result of accrediting the bags' standards document. (Input/output relationship)
Final cause	The outcome of the final submission of the bags' standards document affected the completion of the bag of the first vehicle line's cars through harnessing all the efforts of the team in completing the development of that bag. (Input/output relationship)
Material cause	None

Relational coding of the eleventh critical incident

Critical incident 12: Completing the bags development for the first vehicle line's cars	
	<ul style="list-style-type: none"> - A decisive steering group meeting was held two weeks before the final submission of the bags to see samples of them. - The team responsible for the development of the bags made minor amendments according to the comments received during the steering

Efficient cause	<p>group meeting.</p> <ul style="list-style-type: none"> - The final amended version of the bags submitted to the firm's first manufacturing plant in West Central England and became ready to use in February 2013. - The members of the steering group were critical as they were the ones who check the samples of the amended bags before their final submission and provide the bags' developers with the required final amendments. The team responsible for the development of the bags were critical as they were the ones who amended the bags before their final submission to the respective plant.
Formal cause	<p>The incident can be taken place through:</p> <ul style="list-style-type: none"> - The bags can be submitted without the need for further review meetings. - The bags can be submitted after holding a review meeting within the level of the team responsible for developing them. - The bags can be submitted after holding a review meeting within the steering group level. <p>The incident actually took place as it was mentioned in the last point above.</p>
Final cause	<p>The final submission of the bags of the first vehicle line's cars was driven by meeting the time speed of the firm's production for this specific vehicle line's cars and most importantly to shorten the time frame needed to complete the development of the bags for the other vehicle lines' cars.</p>
Material cause	<p>The ingredients were required for the incident to occur:</p> <ul style="list-style-type: none"> - Final samples of the bags of the first vehicle line's cars. - Amended samples of the bags of the first vehicle line's cars.

Casual coding of the twelfth critical incident

Critical incident 12: Completing the bags development for the first vehicle line's cars	
Time	February 2013

Place	The firm's first manufacturing plant in West Central England.
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Contextual coding of the twelfth critical incident

Critical incident 12: Completing the bags development for the first vehicle line's cars	
Efficient cause	The final submission of the bags for the first vehicle line's cars resulted in turning the focus and the efforts of the bags' developers to complete the bags development of the other vehicle lines' cars. (Feedback relationship)
Formal cause	As the team responsible for developing the bags became in a better position in terms of its knowledgeability of developing such bags, its way to develop the bags of the other vehicle lines' cars has changed and became more efficient. (Feedback relationship)
Final cause	The outcome of the final submission of the bags of the first vehicle line's cars affected the life of the project through shortening its time frame and accelerating its merger with the Body Engineering Unit of the firm. (Input/output relationship)
Material cause	The outcome of the final submission of the bags of the first vehicle line's cars affected the ingredients required for performing the project's activities as two main members of the team responsible for developing the bags were asked to move into other roles within the firm. (Input/output relationship)

Relational coding of the twelfth critical incident

Critical incident 13: The departure of two of the team members	
Efficient cause	<ul style="list-style-type: none"> - A decision was made to move one of the project engineers of the team responsible for developing the vehicle protection bags into a new role in the end of February 2013. - A decision was made to move another project engineer of the team responsible for developing the vehicle protection bags into a new role in May 2013. - The body engineering quality manager was critical as he took the both decisions.
	<p>The incident can be taken place through:</p> <ul style="list-style-type: none"> - The two project engineers can be both moved into a new role in the end of February 2013. - The two project engineers can be both moved into a new role in May

Formal cause	<p>2013.</p> <p>- One project engineer left the project in February 2013 and the other left the project in May 2013.</p> <p>The incident actually took place as it was mentioned in the last point above.</p>
Final cause	<p>The relocation of the two project engineers was driven by the willingness of the senior management, in particular the body engineering quality manager in accelerating the pace required for merging the project with the Body Engineering Unit through removing some of its personnel. The reduction of the project's costs was also a motive for the incident to occur.</p>
Material cause	<p>The ingredient was required for the incident to occur was represented in a transfer statement issued and sealed by the senior management and received by the two project engineers.</p>

Casual coding of the thirteenth critical incident

Critical incident 13: The departure of two of the team members	
Time	February 2013 and May 2013.
Place	The firm's principal engineering center in West Central England.

Contextual coding of the thirteenth critical incident

Critical incident 13: The departure of two of the team members	
Efficient cause	<p>The departure of the two project engineers resulted in inflating the workload for the rest of the team and consequently two new project engineers were recruited to work in the project. (Input/output relationship)</p>
Formal cause	<p>The outcome of the departure of the two project engineers affected the way in which the team executes its activities as a result of increasing the workload for the existing members of the team (Feedback relationship) and recruiting two new project engineers later on to work in the project. (Input/output relationship)</p>
Final cause	<p>The outcome of the departure of the two project engineers affected the capability of the project to proceed with the same productivity and consequently participated in the recruitment of two new project engineers. (Input/output relationship)</p>

Material cause	The outcome of the departure of the two project engineers affected the ingredients required for recruiting two new project engineers as a recruitment statement for the new project engineers needs to be issued and sealed by the senior management and further financial resources need to be allocated for this recruitment (Input/output relationship)
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Relational coding of the thirteenth critical incident

Critical incident 14: The recruitment of two new team members	
Efficient cause	<ul style="list-style-type: none"> - A decision was made to recruit two alternative members in the team responsible for developing the vehicle protection bags in June 2013. - The new members have been taught to understand their new roles within the team. - The body engineering quality manager was critical as he took the recruitment decisions.
Formal cause	<p>The incident can be taken place through:</p> <ul style="list-style-type: none"> - One member could be recruited in February 2013 after the departure of the first project engineer and another member could be recruited in May 2013 after the departure of the second project engineer. - The two new members were simultaneously recruited in June 2013. <p>The incident actually took place as it was mentioned in the last point above.</p>
Final cause	The recruitment of the new two project engineers was driven by the incapability of the project to proceed with the previous productivity with only two existing members.
Material cause	The ingredients were required for the incident to occur were represented in a recruitment statement issued and sealed by the senior management and received by the two new project engineers and financial resources were allocated as a result of the recruitment of the two project engineers.

Casual coding of the fourteenth critical incident

Critical incident 14: The recruitment of two new team members	
Time	June 2013.
Place	The firm's principal engineering center in West Central England.

Contextual coding of the fourteenth critical incident

Critical incident 14: The recruitment of two new team members	
Efficient cause	The recruitment of the new two project engineers resulted in gradually regaining the previous productivity of the project and reducing the workload of the existing members of the team. (Feedback relationship)
Formal cause	The outcome of the recruitment of the new two project engineers participated in resuming the way in which the team executes its activities prior to the departure of the two project engineers in February and May 2013. (Feedback relationship)
Final cause	The outcome of the recruitment of the new two project engineers affected the merger of the project with the Body Engineering Unit as it enhanced the project's productivity and made it in a good shape for the merger process. (Input/output relationship)
Material cause	None

Relational coding of the fourteenth critical incident

Critical incident 15: Termination and handing over of <i>Alpha</i>	
Efficient cause	<ul style="list-style-type: none"> - A decision was made at the end of 2014 to hand over <i>Alpha's</i> activities to the respective centres of competence within the Body Engineering Division. - The quality engineering director was critical as the decision was made based on his approval and the body engineering quality manager was also critical as the decision was made according to his recommendation.
Formal cause	<p>The incident can be taken place through:</p> <ul style="list-style-type: none"> - <i>Alpha</i> project could be entirely handed over to the manufacturing unit. - <i>Alpha</i> project could be partially handed over to the manufacturing unit. - <i>Alpha</i> project could be partially handed over to the respective centres of competence within the Body Engineering Division. - <i>Alpha</i> project was entirely handed over to the respective centres of competence within the Body Engineering Division. <p>The incident actually took place as it was mentioned in the last point above.</p>

Final cause	Handing over <i>Alpha</i> to the respective centres of competence within the Body Engineering Division in particular was driven by those centres' lasting institutional capabilities that can sponsor already-established innovation or technology projects.
Material cause	The ingredients were required for the incident to occur were represented in the following: <ul style="list-style-type: none"> - A hand over statement issued and sealed first by the Quality Division and then by the senior management and received by the Body Engineering Division. - <i>Alpha's</i> specific materials and resources, notably, the standard were transferred to the Body Engineering Division as a result of the handing over process.

Casual coding of the fifteenth critical incident

Critical incident 15: Termination and handing over of <i>Alpha</i>	
Time	End of 2014.
Place	The firm's principal engineering center in West Central England.

Contextual coding of the fifteenth critical incident

Critical incident 15: Termination and handing over of <i>Alpha</i>	
Efficient cause	The handing over of <i>Alpha</i> to the respective centres of competence within the Body Engineering Division resulted in turning the Quality Division's focus into other innovation projects within the division. (Input/output relationship)
Formal cause	The outcome of the handing over of <i>Alpha</i> participated in relocating the project's main actors into new roles within the Quality Division. (Input/output relationship)
Final cause	The outcome of <i>Alpha's</i> handing over accelerated the process in which the protection process is implanted as the actual developers of SHAMMA cars' different parts and components (the engineers of Centres of competence) started to supervise and implement the development and instalment of the protection bags directly. (Feedback relationship)
Material cause	None

Relational coding of the fifteenth critical incident

Appendix 3: The approved ethics review form of this research

Ethics Review

Research project title:	Investigating the innovative dynamic capabilities of firms in high technology industries: An exploratory study of the UK automotive industry (ref/2014/23)
Principal investigator:	Meqbel Aledan (Emanuel Gomes)
Other investigators:	
Date received for review:	7 th May 2013

Lead reviewer:	Andrew Brint
Other reviewers:	Colin Williams, Malcolm Patterson

Our judgement is that the application should			
Proceed	Proceed with the suggested amendments in "A" below	Proceed providing the requirements specified in "B" below are met	NOT be approved for the reason(s) given in "C" below
		X	

A) Approved with the following suggested, optional amendments (i.e. it is left to the discretion of the applicant whether or not to accept the amendments and, if accepted, the ethics reviewers do not need to see the amendments):
B) Approved providing the following, compulsory requirements are met (i.e. the ethics reviewers need to see the required changes):
=> Original version of the form
Not enough information provided. No consent form provided.

=> I am happy that the revised version of the form has covered these objections. AB
C) Not approved for the following reason(s):

Date of decision: 22 nd May 2013	
	Andrew Brint

*** You can see from the excerpt, the ethics application form has been approved.**

Appendix 4: The informed consent form of the current research

Informed Consent Form

Researcher's Name: Meqbel M. Aledan

Researcher's Contact Number: 07584122295

Researcher's Statement:

Research Title:

Investigating the use of innovative dynamic capabilities in automotive firms from a structuration perspective.

Introduction:

To survive in an increasingly competitive and globalised automotive industry companies need to develop innovative dynamic capabilities. This provides manufacturers the opportunity to broaden their product and market range and achieve higher levels of efficiency. Therefore, in this research will investigate key issues associated with the use of dynamic capabilities in car manufacturers within the areas of innovation to review they in which businesses experience the environmental and technological changes and to identify the fine line between the prosperity and the evanescence of organizations in high-tech industries. Looking at these issues from a structuration perspective will assist us to identify how the dualism between structures and agents can either enable or constrain the use of innovation dynamic capabilities.

Research Purpose

The purpose of the research is to investigate the use of innovative dynamic capabilities in automotive firm for the purpose of developing innovation projects. The research aims to understand the mechanism by which structures (rules and resources) and agents (managers and employees) are aligned to use the innovative dynamic capabilities in developing new projects.

Research Methods

In-depth interviews will be conducted to assist the researcher fulfil his research promise. All research participants will be distributed with an individual Informed Consent form, which they must sign, and return to the researcher before or after the interview can take place. This may be done by returning the signed hard copy in the post or by sending an email confirming their consent from through their own personal email account. Each participant will be given at least a period of one week to review the informed consent before signing it and returning it.

Location and Date of Interviews

The interviews will take place at a location of the research participants' choice. The date of the interviews will also be determined based on the research participants' convenience.

Data collection

All interviews will be recorded with a digital voice recorder and transcribed. These recordings will be stored, used and reused for this research purpose only. If the researcher intends to reuse these recordings for additional uses, he is committed to inform the research participants and regain their approvals.

Confidentiality

All data will be stored securely either electronically on computer or in hard copy version in a locked cupboard. As part of the data analysis process, hard copies of the transcripts (raw data) may be given to the doctoral supervision team and a small number of other research participants to review to ensure that the researcher's analysis has resonance. Hard copies will be returned to the researcher and will not remain in the possession of the research participants.

Research Dissemination

Data obtained through this research may be reproduced and published in a variety of forms and for a variety of audiences related to the broad nature of the research detailed above (i.e. conferences, peer reviewed journals, articles etc.).

Any Concerns Regarding Confidentiality, Data Collection and Research Dissemination, Please state below:

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Participant Identification Number for this project:

Please read before signing:

1.I confirm that I have read and understand the information letter explaining the above research project and I have had the opportunity to ask questions about the project.

2.I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without there being any negative consequences. In addition, should I not wish to answer any particular question or questions, I am free to decline.

3.I understand that my responses will be kept strictly confidential (only if true). I give permission for members of the research team to have access to my anonymized responses. I understand that my name will not be linked with the research materials, and I will not be identified or identifiable in the report or reports that result from the research.

4.I agree to take part in the above research project.

Name of Participant (or legal representative)	Date	Signature

Lead Researcher	Date	Signature

To be signed and dated in presence of the participant

Copies:

Once all parties have signed this, the participant should receive a copy of the signed and dated participant consent form and any other written information provided to the participants. A copy of the signed and dated consent form should be placed in the project’s main record (e.g. a site file), which must be kept in a secure location.