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ROLE OF SUBSIDIARIES IN NEW PRODUCT DEVELOPMENT: A STUDY ON FRONT-END OF INNOVATION PROCESS

Şakir Mete KONURALP
114801001

Prof. Dr. Beyza OBA

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Role Of Subsidiaries in New Product Development: A Study on Front-end of Innovation Process

Yerel Şirketlerin Yeni Ürün Geliştirmedeki Rolü: İnovasyon Süreci İlk Faz üzerine bir Çalışma

Şakir Mete KONURALP

114801001

Tez Danışmanı : **Prof. Dr. Beyza OBA**
İstanbul Bilgi Üniversitesi

Jüri Üyeleri : **Prof. Dr. Gonca GÜNAY**
İstanbul Bilgi Üniversitesi
Prof. Dr. Mehmet GENÇER
İzmir Ekonomi Üniversitesi
Prof. Dr. Ela Ünler
Bahçeşehir Üniversitesi
Doç. Dr. Deniz Kantur
İstanbul Bilgi Üniversitesi

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FOREWORD

The main purpose of my PhD journey was to blend my practical experiences with theoretical concepts. In this perspective, as a responsible manager of a local subsidiary, my motivation for this research was to explore the contribution of subsidiary of a multinational company in new product development activities.

I would like to express my great gratitude to my thesis advisor, Prof. Dr. Beyza Oba, for her invaluable guidance and support made it possible for me to focus on specific areas in order not to get lost during my studies. All the face to face and phone communication provided me a solid self-trust and comfort that made this thesis real. I highly appreciate her continued support, patience and encouragement.

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ABBREVIATIONS

Regions		**Country**	
Region 1	WEU	Country 1	TR
Region 2	AP	Country 2	CN
Region 3	NA	Country 3	PL
Region 4	EEU	Country 4	DE
Region 5	SA	Country 5	KR
Region 6	DE	Country 6	JP
Region 7	GC	Country 7	MX
		Country 8	US
		Country 9	FR
		Country 10	IN
		Country 11	UK
		Country 12	SW
		Country 13	HU
		Country 14	SN
		Country 15	IT
		Country 16	BR
		Country 17	RU
		Country 18	RO
		Country 19	CZ
		Country 20	SL
		Country 21	CH
		Country 22	DK
		Country 23	TH
		Country 24	PT
		Country 25	SE

ABBREVIATIONS

PPR	Project Portfolio Review
BU	Business Unit
NPV	Net Present Value
GHQ	Global Headquarters
ROI	Return on Investment
MNC	Multinational Corporation
NPD	New Product Development
NPP	New Product Pipeline
RHQ	Regional Headquarters
RMM	Regional Market Manager
I	Identification
Q	Qualification
ICP	Intercompany Price
R&D	Research and Development
BC	Business Case

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ABSTRACT

The main purpose of this study is to explore subsidiary-driven new product development in multinational corporations through reverse knowledge transfer in order to gain competitive edge in global markets. In this study, we focused on and analyzed the effective management of front-end stage beginning from idea generation, scoping and building business cases in regard to go or no-go decision making process before moving to development stage. A quantitative single case study of a specific multinational company and one business unit is considered as a research site. The resource-based approach is applied in terms of knowledge co-creation and deployment in an organizational dimension. Based on the data from 103 business cases, a statistical model is constructed to evaluate the probability of moving a project between sub-phases of front-end stage. This study contributes to literature by examining cross-functional collaboration, in which refers to contribution of sales function. In global context, multinational corporations are leveraging their subsidiaries as local sales functions to utilize market dynamics in new product development process besides marketing, research and development functions. In addition, considering the conceptual model and survey output, the impact of organization and business case level success factors on achieving superior global new product development performance is indicated.

Key Words: New Product Development, Front-end of Innovation, Reverse Knowledge Transfer, Multinational Corporations, Subsidiaries

ÖZET

Bu çalışmada temel amaç; çok uluslu şirketlerin küresel pazarlarda rekabet avantajı elde etmek için, yerel kuruluşları ile yaptıkları yeni ürün geliştirme çalışmalarını, yerelden merkeze geri bilgi aktarım sürecini dikkate alarak araştırmaktır. Bu çalışmada, temel olarak inovasyon sürecinin ilk adımı olan fikir üretme, kapsam geliştirme ve bunlara bağlı olarak yeni ürün projeleri oluşturma kısmı analiz edilmiş olup, ikinci adım olan ürün geliştirme kısmına geçmeden önceki karar verme mekanizması irdelenmiştir. Araştırma, endüstriyel sektörde yer alan uluslararası bir şirket üzerinde kantitatif yöntemler kullanılarak, tek bir vaka analizi şeklinde yapılmıştır. Projelerin, yeni ürün geliştirme prosesinin alt evreleri arasında ilerleme olasılığının hesaplanmasına yönelik, 103 projeyi kapsayan veri seti dikkate alınarak istatistiksel bir model kurulmuştur. Ayrıca satış bölümünün yeni ürün geliştirmeye olan katkısı, organizasyonda ki bölümler arası işbirliğine yönelik incelenmiş ve bu konuda akademik çalışmalara destek verebilmek hedeflenmiştir. Küresel bağlamda, çok uluslu şirketler, pazarlama, araştırma ve geliştirme bölümlerinin yanında, yeni ürün geliştirme sürecinde pazar dinamiklerinden faydalanmak için yerel iştiraklerinin satış hizmetlerini de kullanmaktadır. Ek olarak; kavramsal model ve anket sonuçları göz önüne alınarak, akademik alanda vurgulanan organizasyon ve proje bazlı başarı faktörlerinin, üstün küresel yeni ürün geliştirme performansı elde etme üzerindeki etkisi belirtilmiştir.

Anahtar Kelimler: Yeni Ürün Geliştirme, İnovasyon İlk Faz, Geri Bilgi Transferi, Uluslararası Şirket, Yerel Şirket

INTRODUCTION

The focus of this study is, to explore the impact of subsidiaries of a multinational corporation (MNC) during new product development (NPD) activities, specifically focusing on front-end stage by using reverse knowledge transfer capabilities covered under resource-based view theoretical approach.

This study focuses on front-end of innovation process with an emphasis on Stage-Gate model (Cooper, 2019) and New Product Development process. The main research topic will draw attention on how Multinational Corporations leverage their reverse knowledge transfer activities between subsidiaries and Global Headquarters (GHQ) through generating successful business cases (BC) in NPD process by considering Resource-Based View (RBV) as theoretical approach.

This study aims to contribute to literature in three dimensions. First, most of the studies in the extant literature on NPD performance is measured by product effectiveness/performance (Brown & Eisenhardt, 1995), profits, revenues and market share as dependent variables in NPD process while this study will only try to find out and understand the reasons of "Go or No-Go" decisions as dependent variable by analyzing the generated business cases in relation with selected independent variables at front-end stage (Figure 4.1). Second, it will focus on foundational (organization level) and business case level success factors (Foleren, Frishammar, Parida & Wincent, 2017) on front-end stage. Third, the literature refers cross-functional (Troy, Hirunyawipada & Paswan, 2008) concept only considering marketing with research and development (R&D) but excluding sales (Homburg, Christian & Ove Jensen, 2007; Rouzies et al. 2005) and the very first study (Ernst, Hoyer & Rübsaamen, 2010) in the extant literature highlighted and investigated the positive contribution of sales function integration with marketing and R&D to NPD performance, in different stages and put emphasis on considering sales, marketing and R&D separately. This study also aims to support the literature in this perspective by taking subsidiaries into account as local sales functions (Joshi,

Ashwin & Sharma, 2004) continuously interacting with customers (VoC; voice of customer) and get first hand market information as an input for NPD processes of the organization, which also refers to the new concept, Reverse Knowledge Transfer (RKT) that is considered vital for knowledge co-creation (Nonaka et al. 2006) in terms of knowledge flow from subsidiary back to MNC headquarters in perspective of absorptive capacity (Kogut & Mello, 2017).

In order to gain competitive advantage in today's turbulent business environment, MNCs focus on two interrelated strategies: globalization and new product development (NPD). By the growing momentum of globalization, the management of the company is becoming more complex and it is important to obtain and reach all the resources and capabilities needed in NPD process in order to be more competitive in the markets (Kleinschmidt, Brentani & Salomo, 2007). In global scale, MNCs consist of geographically distributed networks of subsidiaries that creates a crucial source of competitive advantage in terms of knowledge generation, absorption and transfer. Multinational success in building new product advantage through capturing globally diverse market intelligence (customer, supplier, technology, local regulations, e.g.) is contingent on a multinational's ability to comprehend the overall impact of cross-national collaboration (Bartlett & Ghoshal, 1989; Makino & Inkpen, 2003; Cavusgil, Cui & Griffith, 2005; Griffith & Lee, 2016) and capacity to manage the knowledge transfer between subsidiaries and MNC headquarters. The ability of leveraging knowledge resources that are diffused across subsidiaries should be one of the key competencies of MNCs in order to survive in global markets. In NPD process, cross-functional integration has been widely recognized as one of the key success factors (Florén, Frishammar, Parida & Wincent, 2017) both in theoretical literature and empirical studies. Despite the fact that marketing and R&D functions are mainly reputed in NPD process, the emerging discussions provided a new function to be strongly considered which has a direct relation with customers and able to directly reach to market knowledge; sales. The involvement and information sharing of sales function especially in early stages of NPD is highly vital in terms of generating high-quality ideas (Ernst, Hoyer

& Rübsaamen, 2010) and the subsidiaries are the local sales units of global MNCs that plays a significant role to identify local market (customer) needs and convey the input (explicit and tacit knowledge) through organizational communication channels back to MNC headquarters which is named as "reverse knowledge transfer" (RKT). In this context, the knowledge (the need of customers, preferences and their solution-related inputs) and absorptive capacity of local sales function (subsidiary) is one of the success factors in overall NPD process (Chang & Taylor, 2016) while also, the more subsidiaries gain autonomy the more likelihood the local sales function impact on new product development is also expected to increase (Song, Park and Kwak, 2018).

The mainstream literature focuses on knowledge transfer from headquarters to subsidiaries (Rugman, 2006; Almeida & Phene, 2008; Vahlne & Johanson, 2014; Kogut & Mello, 2017) nevertheless, it is quite significant and observable that knowledge transfer from subsidiaries to headquarters is a growing research area (Ambos, B., Ambos, T. & Schlegelmilch, 2006) that is named as reverse knowledge transfer (RKT). The new concept RKT is considered vital for knowledge co-creation in terms knowledge flow from subsidiary back to MNC headquarters examining two absorptive capacity attributes, subsidiary and customer in order to identify the RKT outcome (Schreiber, Vilela, Vargas & Maçada, 2011; Kogut & Mello, 2017).

The capability of developing knowledge, the autonomy and the way of processing social mechanisms are major driving factors for RKT (Choo, 1996; Faems, Janssens & Looy, 2007; Barkema, Bell & Pennings, 1996). In order to survive in global markets companies have to develop certain competencies and RKT is one of the prevailing factors (Hsu & Iriyama, 2016) since it may considerably contribute to the MNC's competitive advantage. The traditional role of headquarters in MNCs providing main source of knowledge and competencies is transforming and headquarters are acting more as a receiver of knowledge from their globally dispersed subsidiaries (Ambos et al. 2006). The knowledge reversely transferred is

conceptualized as one of the company strategic resources and capabilities that is referred to intangible resources (idiosyncratic resources) which is considered as difficult to imitate and because of this, accepted as potential sources of sustained competitive advantage.

Continuous development and new product launches are the key activities of a company to achieve sustainable success (Lemmerer, Zapilko & Menrad, 2015). In the literature, studies have been conducted to examine successful new product development (NPD) projects and the factors affecting them (Calantone, Montoya-Weiss & Mitzi, 1994; Henard & Szymanski, 2001). New product development (NPD) process has improved for years and companies, especially in B-2-B business, they have implemented more structured systems in order to monitor and allocate resources properly such as gating systems referred to as a multistage, gated disciplined idea-to-launch system, such as Stage-Gate approch which is contrary to an ad hoc approach or no system at all (Cooper, 2019). Stage-Gate approach consists of three major pahses, first, front-end, second, product development and third, product launch. The NPD process is usually managed through a series of filtering (screening) processes in which the idea generation, scoping and finally "business case building" (Cooper 2019) also referred as "projects". Projects created from the collected ideas are reviewed and approved or terminated (Go or No-Go decision), the whole initial process called as "concept development" also mentioned in the literature as front-end, fuzzy front-end, early, discovery, idea and predevelopment stages or phases (Foleren et al. 2017). Through the process of evaluating generated projects, the so-called project pipeline management (PPM), only the best performing projects can go into the next stages of design, development, testing and launch (Figueiredo & Loiola 2012). NPD maintains and improves the overall growth and the profitability of MNCs both in a global and local scale and acts a key role in capturing a sustainable competitive advantage (Kleinschmidt, Brentani, & Salomo, 2007) versus rivals in the global markets.

In this study, quantitative methods are used to study the role of regions and local subsidiaries (countries) of a multinational company (Xzenon) in the new product development (NPD) processes. Data is collected by two instruments, survey and Xzenon company (research site) business cases that are archived by the Xzenon company. Survey is conducted online and Xzenon company business cases that are available at company intranet system extracted to an excel file and then the business cases data set is generated. Both data sources are analyzed seperately and then studied jointly through common variables in order to understand the effect on final outcome.

The findings of this study provide all the evidence for the extant literature based on survey results, first, there is a positive impact of having an *innovation strategy* and interconnectivity with company global business strategy on the front-end activities, second, *customer involvement (absorptive capacity)* in both identification (I) and qualification (Q) front-end sub-stages are considered as a vital activity in order to get technical and commercial confirmation on the front-end process, third, *direct involvement and support of local management* is a positive contribution on the front-end stage, fourth, *time allocation as a resource* provided (to employees who works on innovation projects) by the management supports front-end stage positively, fifth, *cross-functional collaboration* is one of the key success factors on front-end activities which represents the degree of multiple-organizational functions participation that is positively supported, sixth, necessary *systems for NPD process execution* are needed in order to run successful NPD processes and the existence of such systems in the research context provided evidence in terms of supporting the literature. Related to business case level variables, the importance of the *project ownership* is found as a significant factor in survey which supports the literature nevertheless, on the contrary in business case, data analysis did not provide the same result. For *reward and recongnition*, the findings align with the literature in terms of positive contribution however, as some of the quotes provided by the respondents suggested on the contrary which needs to be analyzed by the respective management of the research context. Additionally, the findings on

cross-functional (and cross-national) executive review committee in the research context indicated that there is a quite systematic approach implemented which aligns with the literature. This study also provided findings based on data analysis from business case data set, *stage gate status* (identification and qualification), *project ownership* and *development effort* qualitative independent variables have no association with project status stop/active while *modul, application, development time* qualitative independent variables have and also two quantitative independent variables *business case status update* and *total potential value of the business case* are found as associated with dependent variable projects status stop/active. A group of subsidiaries is found similar based on the best statistical model variables by conducting a cluster analysis. The results indicated that three countries in the given cluster, have *R&D, production facility* and *regional headquarters located* and hold 62% of the total active business case potential value (€). Another finding highlighted that 65% of the total active business case potential value (€) is generated by a single technical field (module-new) as a market segment in the respective business unit (BU) and finally, three countries hold 76% of the active business case potential value (€) of the single field (module-new).

This study contributes to the extant literature, first, subsidiary as a sales function in terms of cross-functional integration with R&D and marketing, second, closing the gap on front-end success by studying organizational and projects specific factors, third, building a statistical model to find the probability of a business case staying in active status during NPD process for only on front-end stage, in addition by applying cluster analysis, I studied on the relationship between similarities of subsidiaries and number of active business cases. The study also supported the literature in terms of practical implications in several ways, first, managers need to make sure to set necessary communication platforms in order to inform employees on innovation strategy, second, a necessary time (resource) should be provided by the management on the front-end as needed for screening and processing an opportunity, third, communication speed should be considered as a success factor in cross-functional integration and managers should also consider this when

managing front-end activities, fourth, designing and providing necessary training programs is one of the key tasks for managers in order to develop people who become member of project teams to run successful NPD activities, fifth, reward and recognition programs should be designed carefully in oder to get high quality of business cases but not just quantity which means ideas created just for getting reward but no value contribution to NPD process, sixth, developed statistical model can be used by the management as a front-end tool to evaluate business case status.

This study has some limitations, regarding the responses, this is a single case study, one specific multinational company operating both in industrial and consumer markets. In addition, only one specific business unit within in the selected company considered as a research context which limits the observations and findings. Regarding the secondary data set used for data analysis, this study is considered for only three-year period that limits the observations.

This study suggests to focus on further research in given areas. First, this is a single case study, the extension of research context to different industries and more companies will allow researchers to analyze a broader view for the research area and consequently the results might change the findings. Second, this study consisders three years observation period and explore the data accordingly. The extension of the time dimension and number of business cases analyzed might support to build the model on larger scale data in order to increase the validity and generalizability. Third, to investigate the decision-making dynamics in groups which consist of different nationalities and functions in order to reveal the impact of cultural, internal business politics and individual level sub-factors (e.g. trust) in joint decision-making process. Fourth, to examine the way of utilizing tacit knowledge (employee skills and experiences so called know-how) on the front-end stage within group members might support RBV approach. Fifth, reward and recognition success factor in terms of real positive impact on the front-end stage need to be further studied in terms of negative impact as a failure factor. Sixth, to identify why some subsidiaries are running higher number and value of “active”

business cases versus other subsidiaries in terms of cultural diversity, local market dynamics and capability of execution GHQ innovation strategy locally. Seventh, this study considers “incremental” product development approach so extending the research for searching the impact of both organization and business case level factors on “radical” product development success might reveal new findings. Finally, a further research specifically focusing on project ownership qualitative variable which is found significant in the survey output but not in the constructed statistical best model, may provide other perspectives for a business case to stay in active or stop status.

The outline of the study is as follows: Chapter 2 explains the theoretical background of this study, Chapter 3 provides literature review on the key concepts of the respective research field regarding the study objective and also reviews the prior published research studies. Chapter 4 contains research method including research site, research design and explains data collection procedures. In Chapter 5, data analysis and findings from survey and business cases data set are presented. Chapter 6, discusses the research findings and the respective existing theoretical literature work. Chapter 7 is dedicated to the contribution of this study to extant literature and to practice through theoretical implications and practical implications. Finally, Chapter 8 summarizes the limitations of this study and provide suggestions for future work.

THEORETICAL BACKGROUND

In this study the main theoretical framework is resource-based view (RBV) which is developed in the strategic management field (Teece, 1982; Wernerfelt, 1984; Barney, 1986b; Prahalad & Bettis, 1986). These authors contributed by initiating and studying on the new paradigm that deeply analysis of inner sources, skills and capabilities of the companies that they control. RBV become one of the main research topic in the literature on strategic management why some companies outperform (Rumelt, 1991) others. This approach is built on economics and organization theory and developed by Wernerfelt (1984) and Barney (1991) that focuses on internal part of the company to identify the heterogeneity in company performance (superior profitability) called as resource-based view. RBV is also discussed in literature based on several published academic research both in conceptual and empirical studies (Barney & Mackey, 2005). Also RBV approach is developed and accepted by large number of academic community despite critics (Lockett, Morgenstern & Thompson, 2009) as a sophisticated and mature theory (Newbert, 2008; Barney, Ketchen & Wright, 2011).

As a company, successfully developing new products and staying competitive in the international arena will be shaped by the resources and capabilities of the company. According to RBV approach, companies that have a sustainable competitive advantage, have capabilities that are special and practiced routines, but also have superior resources that enable to produce more economic products and respond to customer needs by creating higher value or benefit (Peteraf & Barney, 2003). RBV has taken its place in the literature with two main features, by emphasizing as being company-level and productivity-oriented analytical tool. It is necessary to understand these features as basics that highlights the importance, specificity and contributions of the theory. RBV does not replace but is complementary to Porter's Five Forces analysis, strategic group theory, game theory, or other conceptual approaches working at different levels, and each approach provides a different view of the company's behavior and performance

from a different conceptual point of view (Peteraf & Barney, 2003). RBV mainly focuses on the link between the internal characteristics and performance of the company (Barney, 1991) and thus, is an approach that analyzes the company's resources and the competitive advantage that enables it to survive in the market.

Resources are core of this theory in terms of identifying strengths and weaknesses of the company which are assets to the production process, both as tangible or intangible form that is owned and controlled by the organization and provide ability to "exploit opportunities or neutralize threats" (Barney, 1991) while capabilities are referred to as company's capacity to utilize and deploy resources (Brumagin, 1994). Barney (1991) classifies resources in four main clusters; financial resources (e.g. dept capital) and physical resources (e.g. factories, machines) that are referred to as tangible and human resources (e.g. experience, training, skills) and organizational resources (e.g. brand, trust, team work, reputation, culture and knowledge) that are referred to as intangible resources. In terms of business context, the term intangible used in academia (Hamel & Prahalad, 1990, 1994), it is extended to a new definition called as "core competencies" that is referred as the consolidation of all individual and organizationally owned skills and technologies. RBV considers the full range of resources available to the company, such as management skills, processes, routines, and knowledge control and also assumes that they are not perfectly mobile across companies. The importance of gathering these resources is key to the company success and for selection relevant market strategies. Possessing, a rare, valuable, inimitable and non-substitutable resources in the same time enables the company in gaining sustainable competitive advantage (Barney, 1991) and called VRIN resources in which Barney (2002) extended the approach by adding organization (O) dimension which emphasizes the necessity of having essential infrastructure, processes and check points in order to fully make use of VRIN resources that provides competitive advantage to the company. A value of a VRIN resource is valid with the existence of another resource which creates synergy to create higher value for the company. Another key aspect of RBV is imitability that hinders rivals to un-codify, find and develop the same resources which causes

losing competitive advantage in the respective markets in which it can be blocked with three costly to apply mechanisms; history (path dependency), causal ambiguity and socially complex organizational architecture. The concept "competitive advantage" refers to a specific definition by Barney (1991), that highlights, not implementing a strategy for value creation while in the mean time, the current and potential competitors are able to do so, also if the rivals do not have the capability to copy the benefits of the strategy, then the given company assumed as gaining 'sustained' competitive advantage" position in the respective market and as a result achieving above average level of profit.

NPD is driven by integration of dispersed knowledge throughout the process such as market knowledge, scientific, technological, human resources, culture and, concluding in recognizably distinct products. In the NPD process, the use of company's resources such as tangible (e.g., machinery) or intangible (e.g., explicit or tacit knowledge) are vital for launching new products (Hashiba & Paiva, 2016) and according to Kleinschmidt, Brentani & Salomo (2010), the tacit knowledge impacts performance in global NPD.

Knowledge is personal as highlighted by Davenport and Prusak (1998) and the willingness to cooperate between colleagues enable organizations to manage knowledge resources which contributes to the company's success. The knowledge is seen as a strategic asset and the capability of gathering and integrating knowledge by the company is unique, not easy to uncodify and rare, so it supports sustaining superior company innovation capability which is one of the core attributes for gaining sustained competitive advantage (Lin, 2007).

RBV also evolved based on the transformation of strategic management field in parallel to several developments in industrial organizations. The increased globalization and competition shortly changing environment, required competitive strategies to set and implement in terms of managing; protecting, renewing and reconfiguring the current and also building new resources (dynamic capabilities) by

considering the changes taking place in the environment which makes the resources redundant (Eisenhardt & Martin, 2000). The strategic decision for management is restricted based on company's resources (VRIN or not) which are the determinant factors for targeting short (will be copied so not sustainable) or long term return. In the turbulent periods resources cannot be stable and in order to cope with external changing conditions, companies develop new resources for future survival which prevents generating core rigidities and let company sustain its competitive advantage.

Resources are stated as an indication of physical and knowledge-based assets which enable a company to design and implement new strategies which lead to differences in performance (Wernerfelt, 1984). By referring to RBV approach, in the extant literature, the tacit knowledge is indicated as an intangible resource (Hatch & Dyer, 2004) and a source of sustainable competitive advantage. The necessity of continuous reconfiguration and renewing of knowledge as dynamic capability for company performance (Afuah, 2000) such as capability of knowledge transferring between subsidiary and MNC in order maintain updated information flow as an input to senior management and NPD teams for their strategic decisions in NPD stage-gate processes. This study links its conceptual framework to RBV in two dimensions. First, tacit knowledge which considers market estimation (new business potential value) by subsidiaries and studied as an indepent variable, also understanding of the decision making dynamics in Xzenon company committees in order to decide to move business cases between stages which is not considered in this study (latent) but proposed as a further research. Second, explicit knowledge which is codified and recorded, can be transmitted in a systematic manner and in this study, the subsidiary input back to MNC for new product development is considered and studied with generated business cases in Xzenon company intranet system.

LITERATURE REVIEW

This study considers RBV as a theoretical framework by highlighting knowledge as a resource analyzed by reverse knowledge transfer from subsidiaries to MNC. Stage-gate model is also considered while exploring the impact of subsidiaries of a multinational corporation during new product development activities specifically focusing on front-end stage.

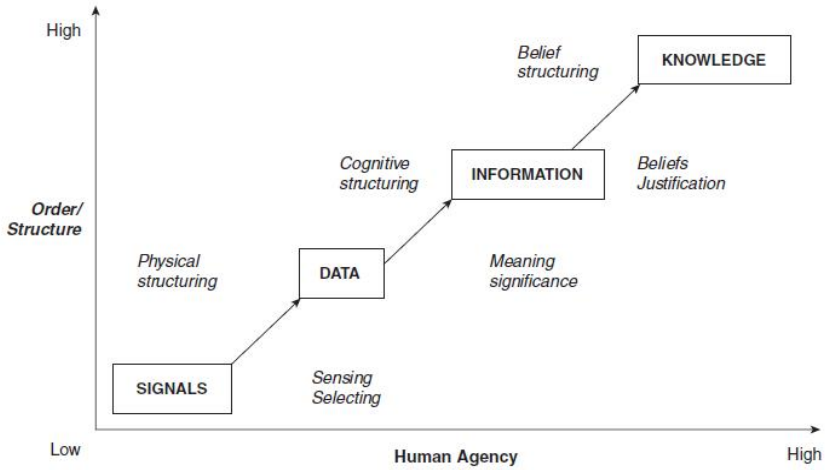
3.1. REVERSE KNOWLEDGE TRANSFER

The concept of knowledge sharing, organizational learning activities and social capital enable essential insights for utilizing knowledge management (Jashapara, 2005).

Knowledge management has been affected by various disciplines such as social sciences, philosophy, cognitive sciences, management sciences, knowledge engineering, artificial intelligence, information sciences and economics. The concept is widely discussed in the literature and generally accepted with three main dimensions; data, information and knowledge. There are variety of definitions that have been made by many authors in the literature and it is quite obvious to observe similar and contrast ideas; finally, another dimension is added which is called wisdom. (Rowley, 2007).

An organization uses information in three areas that is strategically important: to understand the change in its environment; to form new knowledge to produce a new idea; and taking decisions to carry out certain actions. Through knowledge creation (Figure 3.1), individual ideas are transformed into knowledge which can be processed for designing new products or improve performance (Choo, 1996).

Figure 3.1 Data, Information and Knowledge



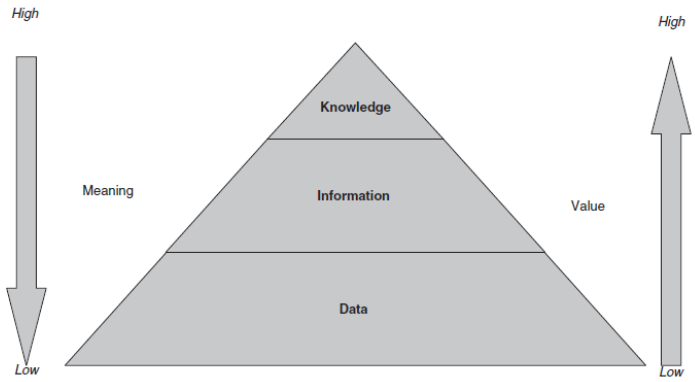
Source: Choo, 1996

In order to elaborate the definitions which are widely dispersed in the literature, this study referenced some example definitions in order to clarify, summarize and emphasize the meaning of knowledge which is one of the main discussion topics of the study;

- "Data are discrete, objective facts or observations, which are unorganized and unprocessed, and do not convey any specific meaning" (Chaffey & Wood, 2005).
- "Information is data which adds value to the understanding of a subject" (Chaffey & Wood, 2005).
- "Information becomes knowledge through the process of belief structuring or the formation of justified, true beliefs about the world" (Choo, 2006).
- "Knowledge is data and/or information that have been organized and processed to convey understanding, experience, accumulated learning, and expertise as they apply to a current problem or activity" (Turban, 2005).
- "Knowledge builds on information that is extracted from data while data is a property of things, knowledge is a property of people that predisposes them to act in a particular way" (Boddy, 2005).

- “Knowledge is know-how, and is what makes possible the transformation of information into instructions. Knowledge can be obtained either by transmission from another who has it, by instruction, or by extracting it from experience” (Ackoff, 1989).
- “Knowledge is the combination of data and information (Figure 3.2), to which is added expert opinion, skills, and experience, to result in a valuable asset which can be used to aid decision making” (Chaffey & Wood, 2005).

Figure 3.2 Data, Information and Knowledge



Source: Chaffey & Wood, 2005

In the literature, there are detailed explanations for different dimensions of knowledge which is highlighted in (Baskarada & Koroniosa, 2013) a study as, “subjective/internal phenomenon, is context dependent, tacit, embedded, and socially constructed”. Employees know valuable information but it is not easy to share this information within the organization. Employees are required to share their problems, experiences, foresights, the ways of doing business, tools and best practices. In order to achieve a competitive advantage, many organizations are primarily interested in technological infrastructure and can ignore the most important strategy that provides competitive superiority. Knowledge is usually identified in two forms; either explicit or tacit (Schreiber et al. 2011). There are several definitions in literature according to Polanyi (1967) tacitness is mentioned as non-verbalized, non-articulated and intuitive while according to Martin and

Salomon (2003), highlighted as complex and difficult to codify and tough to transfer it. The well-protected tacit knowledge in the mind of the employee is the only non-imitable organizational resource (Senge, 1990). “Tacit knowledge is knowledge inserted within the human intellect through experience and different jobs whereas Explicit knowledge is knowledge codified and digitized in books, archives, reports, white papers, spreadsheets, memos, training courses” (Awad & Ghaziri, 2004). Tacit knowledge is inserted within the person, whereas explicit knowledge is codified and recorded, can be transmitted in an efficient way, through formal dialect and outlined for sharing. Explicit knowledge can be effectively handled through data advances by utilizing computers, electronic databases and paper reports (Rowley, 2007).

Based on RBV approach, knowledge is one of the sources of maintainable competitive advantage (Nonaka, 1990, 1991, 1994; Nonaka and Takeuchi, 1995; Nonaka and Toyama, 2003). The capacity of organizational knowledge creation (Nonaka et al. 2006) permits companies to be responsive within the individual changing trade environment. Knowledge creation is frequently seen as the ‘‘front-end” of innovation process where knowledge plays an extraordinary part in achieving new product development victory because it has tacit, socially complex and causal ambiguous characteristics which makes it troublesome for competitors to mimic the success components of the given company. (Erden, Krogh & Nonaka, 2008).

Internationalization is a quite significant, important but in the meantime, complex process in terms of organizational learning (Barkema, Bell & Pennings, 1996). Diverse local preferences, culture, economy, society language, business practices, systems, governments, partners, customer behavior, competitors, machine park, technological capabilities, education, experience level of employees in local organizations are some of key attributes when acquiring local market knowledge and sharing with MNC’s headquarters for series of business activities to be conducted. The local market knowledge is composed as explicit (e.g., macro-

economic statistics and codified market intelligence) or more tacit (e.g., customer or local organization employees' accumulated experiences), the need and the process of explicit knowledge is obvious. In the extant literature, the emphasis on the tacit type of local market knowledge is considered more vital and strategic for the MNC (Barkema et al. 1996) as it is more difficult to transfer. Another reality for tacitness is, sometimes the difficulty of articulation and analysis of the tacit knowledge by the owner while transferring to others (Polanyi, 1962).

MNC is formed of a series of geographically spread over local organizations called as subsidiaries and the headquarters (Ghoshal & Bartlett, 1990) which draws close attention by academia since late 1980s as stated by Kogut (1989). The global organizational structure has a direct influence on the knowledge transfer within the company and observable in two dimensions, formal reporting across functions (explicit) and employee skills and experiences so called know-how (tacit). Knowledge transfer is a bilateral process between individual who possesses the knowledge and the individual who receives and this vital process for organizations depends on the individual's abilities and willingness to conduct (Faems, Janssens & Looy, 2007). Language, tacitness, complexity of organizational structure, geographical distance of organizations, culture, the knowledge transfer experience of the organization in the past, technological capabilities are key variables that directly impacts and mediates on transmitting processes. Another significant fact in transfer process is the sender incentives, capability and willingness (motivation to receive) of acquiring and absorbing (absorptive capacity) by the receiver who applies and exploits in its operations, also the presentation of transmitted knowledge which refers to the type of codification.

Knowledge transfer from a subsidiary is positively linked with the subsidiary's knowledge stock and it is motivation to share throughout proper communication channels (Gupta & Govindarajan, 2000).

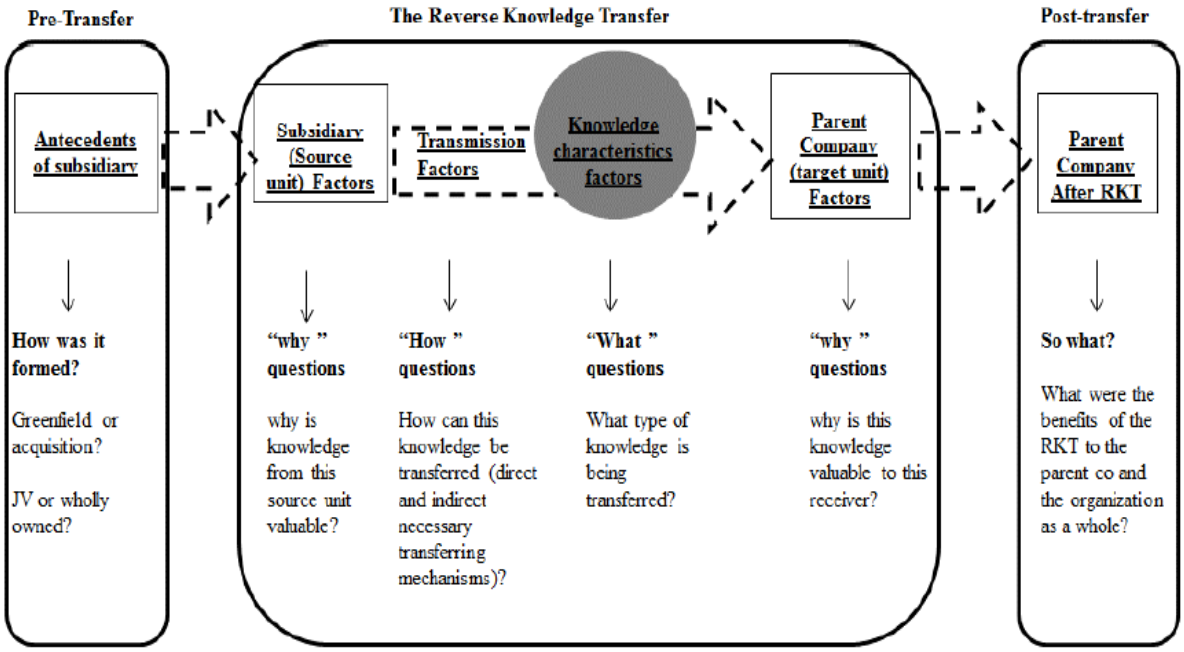
Continuous participation and interaction within the company between individuals and functions throughout structured or unstructured business practices maintains the knowledge acquiring and enable knowledge transfer. The barriers for knowledge transfer are also negative impact on the business processes especially in NPD which requires reliable and sufficient information for individual each phase (stages) of the process. In the literature, variety of examples are available referring the barriers underlined as absorptive capacity, relationship difficulties and causal ambiguity (Szulanski, 1996), lack of trust, differences in culture, language, lack of a time and place for meeting, benefits for knowledge owners (reward), belief that knowledge is exclusively attributed to certain groups and lack of tolerance for errors or the need for assistance (Davenport & Prusak, 1998). Absorptive capacity is the ability to identify external new knowledge and its value, then transform it to a usable company capability for variety business purposes through absorption process. The concept itself is a key attribute for knowledge transfer and has various dimensions about its significance and improvement capability for transmitting process are discussed and mentioned in the extant literature (e.g., trust, organizational structures, ability to apply knowledge like using information technology, training, intra-organizational alike transmitting processes, common experience in solving problems, long-term relationship, interaction and agreed common targets between parties, expatriate rotation, formal rules, well established communication tools). Also direct impact on corporate learning (Schreiber et al. 2011) while MNC headquarters is supplied continuous valuable information by its subsidiaries which can be referred as local knowledge generation units that are geographically dispersed. According to Mudambi and Navarra (2004), the magnitude of importance and quite high percentages of their contribution in terms of knowledge creation is quite visible and accepted by business managers and also in academia which makes subsidiaries unique assets of their parent corporations.

To conduct an efficient knowledge transfer, the input received should be well comprehended, absorbed and finally applied to business processes in order to gain value for the organization (Li, Chang, Lin & Ma, 2014).

Sharing knowledge through cross-functional co-operation and coordination in order to extract and transfer local market-related knowledge back to MNC headquarters (bottom-up transfer) is called as Reverse Knowledge Transfer (RKT). Although mainstream literature mainly addressed knowledge transfer from headquarters to subsidiaries as traditional information flow, (Rugman, 2006; Vahlne & Johanson, 2014) the RKT concept is also studied in a growing trend, in terms of being limited as a research subject in academia, its significance for knowledge creation and role in MNCs as one of the crucial factors to reach global success and have competitive advantage (Kogut & Mello, 2017). Headquarters used to be the central value capturing basis and creating necessary infrastructure for being competitive advantage in the global arena while subsidiaries used to be referred to as the receivers, nevertheless, the subsidiary contribution for knowledge creation and value capturing became more significant, visible and accepted within the MNCs by locating, possessing and absorbing international resources to gain competitive advantages in the respective markets. According to Porter (1990), the knowledge accumulated from subsidiaries (various countries) which possess local information is emphasized as *unique*.

The shift of knowledge co-creation from headquarters to its subsidiaries gained quite significant attention both in business and academic perspectives stated as a RKT new concept and also emphasized as a complex process according to Kogut and Mello (2017) which is visualized in the Figure 3.3.

Figure 3.3 MNC's Internal Knowledge Flow Complete Transferring Process



Source: Kogut & Mello, 2017

The whole RKT process is mutual and socially complex between sender and receiver, both explicit and tacit knowledge is managed to transmit through the organizational structure via technical tools and also social relations (relational capital, close intra-organizational social ties enable trust, commitment and knowledge sharing) in order to keep, generate, re-configure and renew existing capabilities (gaining dynamic capabilities) for achieving and maintaining sustained competitive advantage.

3.2 NEW PRODUCT DEVELOPMENT (NPD) AND THE STAGE-GATE PROCESS

The global strategies set by the MNC headquarters are identified by various internal and external factors which is formulized by gathering and coordinating knowledge from different sources. In this context, both leveraging the knowledge between headquarters and subsidiaries in terms of NPD and its performance (Hansen & Nohria, 2004) and also subsidiaries rising role in NPD process (Mudambi, 2002)

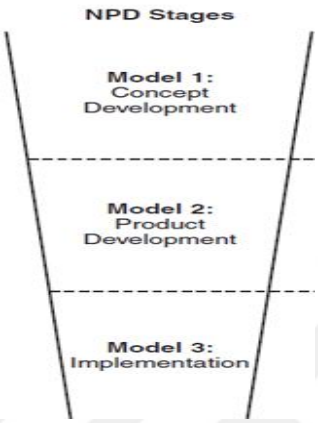
are studied in several aspects in the extant literature such as local market knowledge collection through customers. A subsidiary has a specific strategic role as it has a unique set of interaction both internally and externally by being as a bridge between local reality and MNC headquarters. The company value is closely related with its customers and significantly play role in value creation within different parts of the organization especially in NPD process (Cui & Wu 2016; Joshi & Sharma 2004). According to Fang (2008), customer participation in knowledge accumulation consists of two parts, customer participation as an *information source* (e.g., like information sharing and exchange between the company and customers; company-led) and customer participation as a *co-developer* (e.g., customers significantly involve in developmental tasks of the company), also connectivity to customer network and NPD process are *interdependent*. Customer participation has a positive impact on NPD performance, involving customers in the ideation stage as it improves new product financial performance directly according to Chang & Taylor (2016).

In the first step of NPD process that starts with idea generation, customers share valuable insights about their needs and general expectations and also get involved in novel idea selection process which all enable for the company to minimize the failure of new product outcomes (Carbonell, Rodr´ıguez- Escudero & Pujari, 2009). This also helps the company to avoid waste of resources on low-value NPD business cases (Ernst, Hoyer & Rübsaamen, 2010). Due to the speed of technology in IT and internet, customer inclusion and help improved and demonstrated positive contribution for developing new products (with new idea inputs) for the companies who implemented customer focus innovation strategies (Hippel et al. 2011).

Companies separated the NPD process into different stages (Figure 3.4) referred as concept development, product development and commercialization (implementation or launch) in order to increase the efficiency of stage management (Banerjee, Dubiel, Ernst & Subramaniam, 2018). According to Cooper and

Kleinschmidt (1993) concept development (front-end) phase of the NPD process has a direct and significant impact on outcomes.

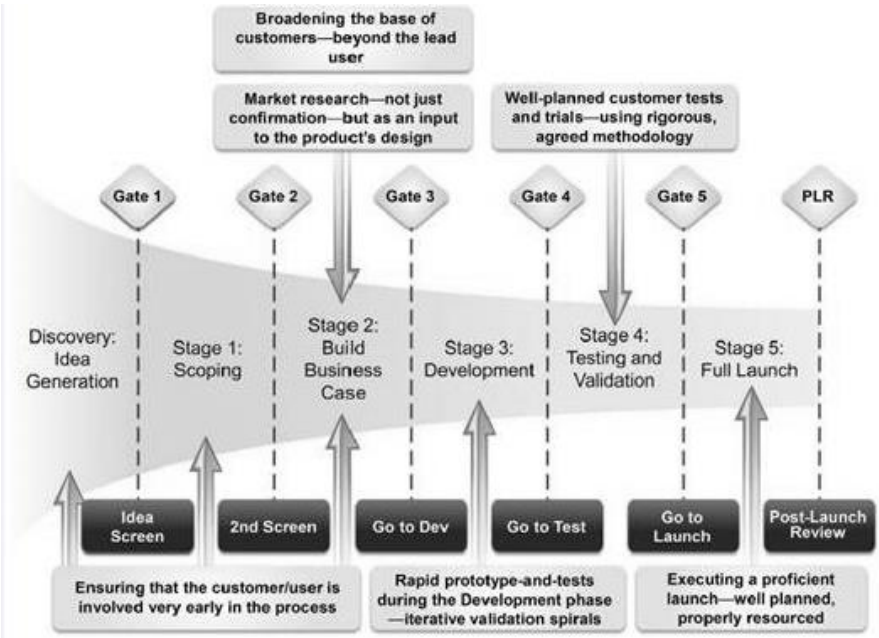
Figure 3.4 NPD Stages



Source: Ernst, Hoyer & Rübsaamen, 2010

This study will consider Cooper's (2019) multistage (Figure 3.5) NPD process flow as a research reference.

Figure 3.5 NPD Multistage Process Flow



Source: Cooper, 2019

Cooper (2019), one of the widely cited authors in the literature for his studies on NPD concept, recently elaborated and updated success factors for NPD performance by classifying them in three main clusters; new product “projects" (also refered as business cases), organizational and systems-methods. Another study by Florén et al. (2017) refers to foundational success factors (overall company level) and projects level (company’s individual business case level).

In recent years, newly developing communication technologies enabled MNC to better respond to their customers and to leverage some economies of scale by developing more unique products by implementing new product development (NPD) processes. By nature, the subsidiaries are becoming valuable knowledge sources to ouperfom the rivals in global markets (Dubiel, Durmusoglu & Gloeckner, 2016).

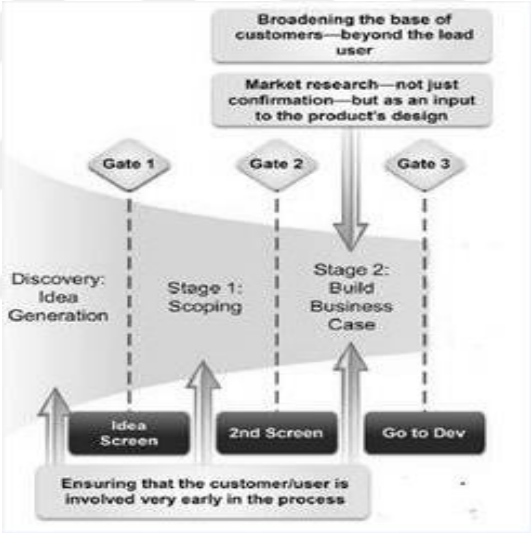
New product development (NPD) projects are generally administered through different gates, where ideas compete for various resources. Ideas are turned into projects, and these projects are processed through basic steps like reviewing, approving or terminating and as a result, only the best performing projects succeed to continue to the next stage till deployed into the market place. Today, organizations try to lead more than one NPD project at a time and run product pipeline management (PPM), where a set of active projects are evaluated together by respective decision makers in each different stage (Figueiredo, Paulo & Loiola, 2012).

As indicated by Figueiredo, Paulo & Loiola (2012), the research of global NPD processes’ impact on company success should be analyzed especially for discovery, development and launch stages separately. As highlighted by Koen et.al (2001), Kleinschmidt, Brentani & Salomo (2007) in the extant literature, there is comparatively less research putting emphasize on the front-end of the NPD process, that is why this study considers the role of a subsidiary in NPD process by only focusing on front-end stage.

RESEARCH METHOD

In this study, quantitative methods are used to explore the role of regions and subsidiaries of a multinational company in the new product development (NPD) processes. The study utilizes stage gate model and focuses only on Stage 1 and Stage 2 in multistage process flow (Figure 4.1).

Figure 4.1 NPD Multistage Process Flow, front-end stage



Source: Cooper, 2019

The main purpose of quantitative research is to identify and emphasize the phenomena that is observed by the researcher by interpreting the data collected. As stated by Cohen (1980), quantitative research is described as a social study which applies empirical approaches and explanations. In addition, Creswell (2003) expresses the definition as a positivist thinking for knowledge developing and implementing research techniques such as experiments and surveys to gather data by using selected instruments which provides statistical data.

The meaning of quantitative research according to Aliaga & Gunderson (2002) is; explaining a phenomenon by collecting of numerical data which are analyzed using mathematically based methods such as statistics. The quantitative data does not always necessarily require data that is naturally available in quantitative format. Non-quantitative data (like beliefs and/or attitudes) can be transformed into quantitative form by using measurement instruments such as Likert scales. Creswell (2003, p.21) highlights on selecting the quantitative research by stating "if the problem is identifying factors that influence an outcome, the utility of an intervention, or understanding the best predictors of outcomes, then a quantitative approach is best".

Also the main purpose of quantitative research is to make generalization about the truth (for population) by using data from samples.

This study aims to predict an outcome based on certain factors, that is why quantitative method is selected for the research.

4.1 RESEARCH SITE

4.1.1 The Organization of Xzenon Company

In order to provide confidentiality, in this study, the organization will be named as Xzenon company.

The organizational structure consists of one GHQ based in Europe including business units additionally regions (located in Europe, Asia - Pacific, Americas) and countries. Employees work in a globally designed organization and cooperate through cross-functional structures.

There are 7 regional offices in which each region is formed of variety of countries (subsidiary clusters). The Company has 64 owned subsidiaries and conducts all sales and marketing activities through these local subsidiaries and also has direct

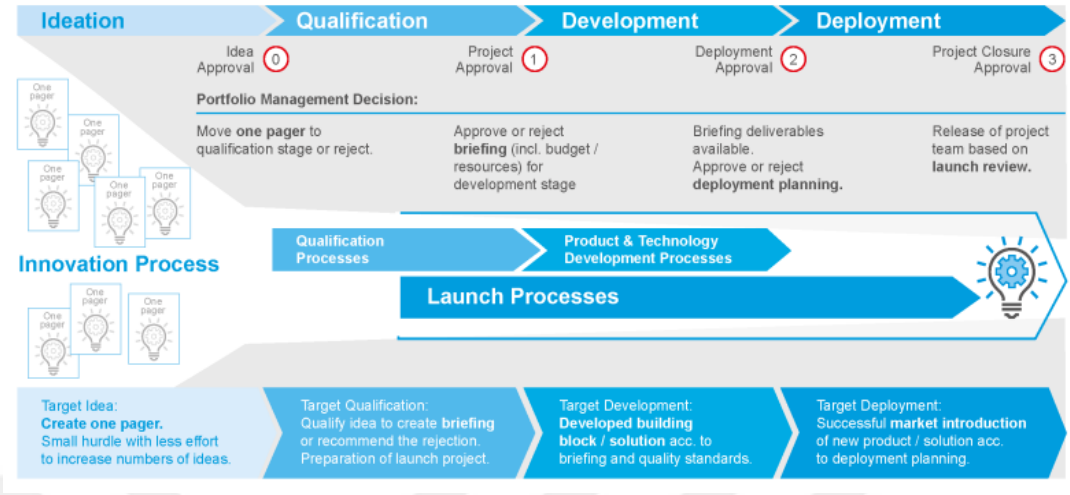
export sales from global headquarters to the rest of the markets where there is no established subsidiaries. The company is managed by Regional headquarters in Europe, North & Latin America, Greater China and Asia-Pacific with 4,900 employees. The company serves global markets with a large product portfolio for applications in both industrial and consumer sectors such as, automotive, electronics (e.g. smartphones, tablets), printing-paper, building supply, security concepts for effective brand-product protection, craftsmen, stationery, food and DIY (Do It Yourself). All markets are served by different business units where located in GHQ and also each business unit has sub segments according to the respective market approach of the company. The company has production facilities in Europe, North America, and Asia. 5 % of company sales are allocated to research and development, there are 500 employees worldwide working at the company's own labs transforming innovative ideas into new applications and improving existing products. The company has R&D labs in Europe, America and Asia - Pacific which develop more than 70 new products each year and many patent protection is obtained.

4.1.2 NPD process in Xzenon Company and Stage-Gate Model

This study will consider Cooper's (2019) multistage (Figure 3.5) NPD process flow as a research reference (basis) streamlined model which originated from Cooper's (1983) study.

The Xzenon company applies similar model for internal NPD processes (Figure 4.2). The process runs on company intranet system within a given structure which is used by all involved parties during NPD. There is a standard powerpoint format that is filled by countries, aligned with their regions and uploaded to intranet system by project owner (region) which is then monitored and updated globally. The company calls the new product develeopment system as new product pipeline (NPP) management. Figure 4.2 presents the over all NPD process in Xzenon company from ideation to deployment (new product launch).

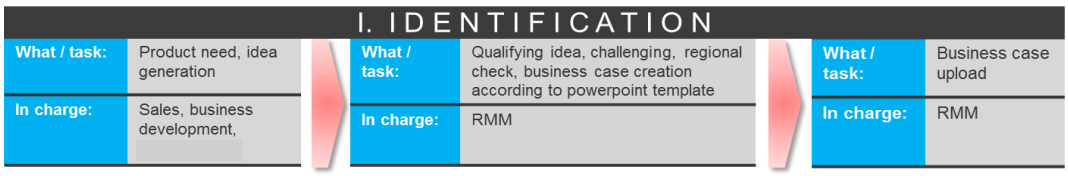
Figure 4.2 Innovation Process



Source: Xzenon Company

The front-end stage is divided in two sub stages; *identification* (ideation) which is mainly driven by countries (market and customer input) and regions (utilization) for idea generation, scoping and business case creation (Figure 4.3). The evaluation of uploaded business cases are conducted by a group of experts in GHQ and this is called *qualification* stage (Figure 4.4). The group is mainly designed by different functions (e.g. central R&D and R&D of respective BUs, controlling, product management, marketing and if necessary region and country) and they are the decision makers to take the business cases to development stage or otherwise. The team either keep the project in "Active" status called as "GO" and move the business case from qualification to development stage or in "Stop" status called "No-Go" as a key decision making group within respective business unit.

Figure 4.3 Gate Process - Identification



Source: Xzenon Company

Each business case is evaluated by teams who belong to the sub segments of the respective business unit and teams provides feedback to regions about officially

submitted business cases within 4 weeks after submission about the status as moved to qualification (keep as Active) or Stop in identification stage. In regional headquarters (RHQ), the respective business unit market management is the *project owner* and responsible to follow up all details of the uploaded business cases, setting necessary network between country and GHQ.

Figure 4.4 Gate Process – Qualification

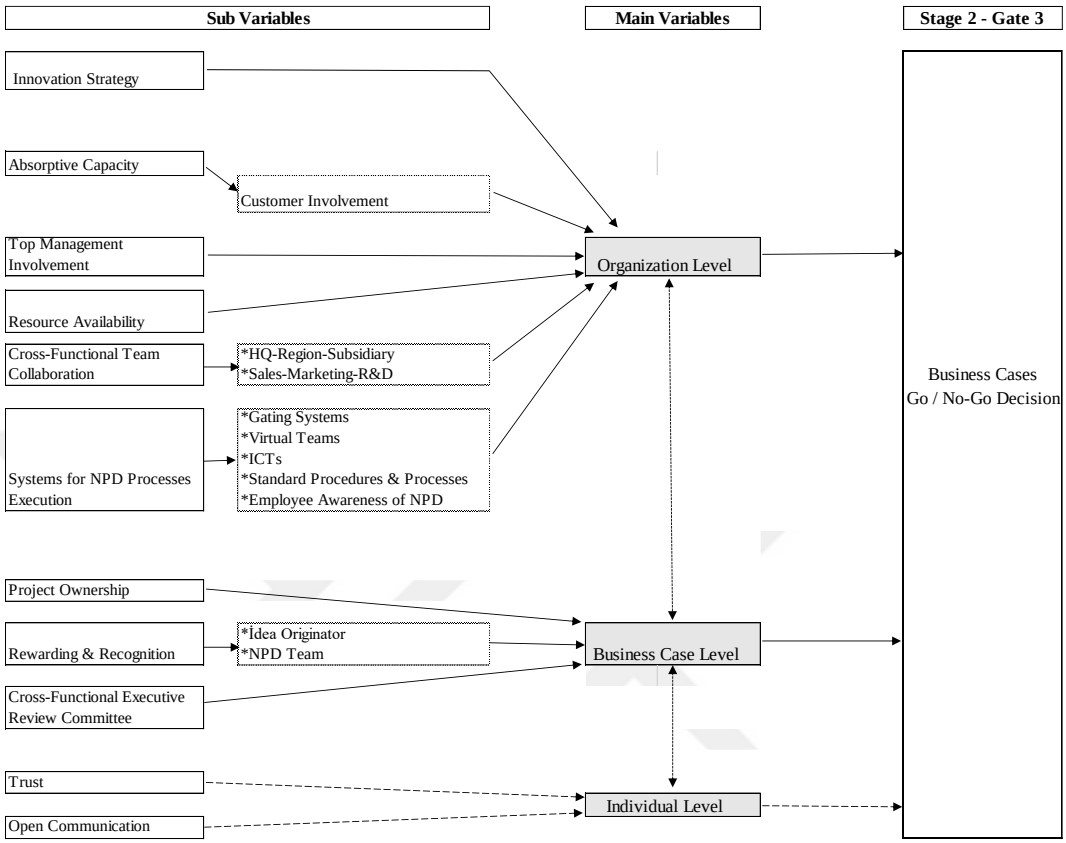
Source: Xzenon Company

The feasibility in qualification stage might take up to maximum 6 months, depending of the complexity and the need for longer period of testing time and finally, the team decides to move the business case to development stage or stop. In GHQ, the respective business unit market management is the project owner. Especially in qualification stage, top management (head of respective BU and board member) is also informed with internal reporting system and requested their active participation in group meetings, they are also involved in decision-making process in strategic business cases.

4.2. RESEARCH DESIGN

A survey is designed by considering conceptual model (Figure 4.5) in order to understand the success factors realated to organization level, business cases and individual level as indicated in the model.

Figure 4.5 Conceptual Model



In the extant literature, front-end stage has a direct influence on final go or no-go decision (Cooper, 1988; Cooper, Edgett and Kleinschmidt, 2002) and overall project success (Cooper and Kleinschmidt, 1987; Verworn et al. 2008). It is also observed that there are identified factors on front-end stage of NPD process which are critical for developing new products successfully. Two major types of success factors are emphasized (Foleren et al. 2018) as foundational (organization level, common to all business cases) and business case level. The front-end stage starts with new idea generation step, idea scope and runs till business case creation is then Go or No-Go decision-making point and that period is a dynamic, socially interactive (Akbar & Tzokas, 2013) and containing continuous knowledge transferring and processing (De Brentani & Reid, 2012). The concept managing capability of the front-end stage is crucial and significant effect on product outcome (Murphy & Kumar, 1996) which in business terms needs to be closely

monitored by the management and takes necessary actions throughout the stage for all the complex activities by considering emphasized success factors in the literature, so the academic research provides quite concrete evidence for business practitioners which supports running a solid and smooth NPD processes.

This study mainly considers organization and business level main variables from the conceptual model and their selected sub variables. Individual level (latent) variables are not studied**.** The survey design is based on; Innovation Strategy, Absorptive capacity (customer involvement) , Top Management Involvement, Resource Availability, Cross-Functional Team Collaboration, Systems for NPD Processes Execution (gating systems, ICTs, standard procedures & process, employee awareness), Project Ownership, Rewarding & Recognition, Cross Functional Executive Review Committee.

1-Innovation Strategy: existence of defined product innovation and technology strategy and the link to corporate business strategy.
2-Absorptive Capacity: organizational willingness and ability to learn and valuing for the knowledge received in order to exploit new business opportunities (customer involvement).
3-Top Management Involvement: leading the innovation efforts throughout whole organization in terms of strategy building, resource availability, change management, coordinating, monitoring and decision-making.
4-Systems for NPD Processes Execution: the way NPD is organized, infra-structured, utilized and informed to the organizational functions.
5-Project Ownership: the responsible person or team in charge to run full NPD.
6-Rewarding & Recognition: a motivational tool for members who take place in the NPD process.
7-Resource Availability: quantity such as people, money, time allocation, quality such as placing capable people.
8-Cross-Functional Team Collaboration: screening and selection of ideas take place in meetings involving different functional teams.

9-Cross Functional Executive Review Committee: according to prior research, cross-functionality is a crucial success factor not only at the management level but also at the department and functional levels. An executive review committee provides differenet views and competencies during the front-end activities.

The variables searched are operationalized in Table 4.1.

In order to build the survey, a preliminary version of the survey is sent to the subsidiary (four different business unit sales managers), region (one respective business unit market manager) and at GHQ business unit X (one head of marketing) and inline with their feedback revisions on the survey questions are made.

The questions are designed from Q2 to Q12 and Q15 are Likert type with 5 level responses which range 1=Poor, Extremely Dissatisfied or Unimportant and 5=Excellent, Exteremly Satisfied or Exteremley Important. In Q13-Q14 participants are asked to rank an issue; 1 meaning the least important and 5 the most important. The Q16 is a yes or no type of question.

The attributes of survey respondents in terms of location, which refers to global headquarters, regional headquarters, countries and function, which states the selected departments (sales, marketing, R&D, top management) within the organization and the role, that represents the organizational titles of the respondents are given in Table 4.2.

Table 4.1 Survey Questions & Variables

VARIABLES	SURVEY QUESTIONS														
A Survey related Variables	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16
Organization Specific Variables															
1 Defined Innovation Strategy						X									
2 Absorptive Capacity			X	X								X	X		
3 Top Management Involvement							X								
4 Resource Availability					X		X								
5 Cross-Functional Team Collaboration										X	X			X	X
6 Systems for NPD Processes Execution	X	X													
Business Case Specific															
7 Project Ownership									X						
8 Rewarding & Recognition								X							
9 Cross Functional Executive Review Committee	Information is provided by condcuting one to one interview with responsible employee in GHQ who coordinates all NPP related monitoring activities														
B Business Case Data Set related Variables															
1 Total Potential Value												X			
2 Development Effort												X			
3 Development Time												X			
4 Project Status Updates														X	

Table 4.2 The Respondent Attributes

	LOCATION	FUNCTION	ROLE
Respondent 1	HQ	Sales	Global Key Account Manager
Respondent 2	HQ	Sales	Global Value Chain Manager
Respondent 3	Region	Marketing	Head of Market Management
Respondent 4	HQ	R&D	Director R&D
Respondent 5	HQ	Marketing	Senior Product Manager
Respondent 6	HQ	R&D	Director R&D
Respondent 7	HQ	Sales	Global Value Chain Engineer
Respondent 8	HQ	Top Management	Head of Business Unit
Respondent 9	HQ	Sales	Segment Manager
Respondent 10	Region	Sales	Head of Sales
Respondent 11	HQ	Sales	Global Key Account Manager
Respondent 12	HQ	Sales	Regional Sales Director
Respondent 13	HQ	R&D	Lab. Manager
Respondent 14	HQ	R&D	Lab. Manager
Respondent 15	HQ	Sales	Global Value Chain Engineer
Respondent 16	HQ	R&D	R&D Manager
Respondent 17	HQ	Marketing	International Product Manager
Respondent 18	HQ	Top Management	Head of Business Unit
Respondent 19	HQ	Marketing	Marketing Director
Respondent 20	HQ	R&D	Vice President R&D
Respondent 21	HQ	Sales	Global Value Chain Manager
Respondent 22	HQ	R&D	Global Manager Application Process Engineering
Respondent 23	HQ	Top Management	Vice President Business Unit
Respondent 24	HQ	Sales	Project & Process Development Manager
Respondent 25	HQ	Marketing	International Group Product Manager
Respondent 26	Country	Sales	Sales Manager
Respondent 27	HQ	Marketing	International Product Manager
Respondent 28	HQ	Sales	Global Value Chain Engineer
Respondent 29	HQ	Sales	Global Value Chain Manager
Respondent 30	HQ	Sales	Global Value Chain Engineer
Respondent 31	Country	Sales	Key Account Manager
Respondent 32	Country	Sales	Key Account Manager
Respondent 33	Country	Sales	Key Account Manager
Respondent 34	Country	Sales	Key Account Manager
Respondent 35	Country	Sales	Sales Engineer
Respondent 36	Country	Sales	Sales Director
Respondent 37	Country	Sales	Sales Specialist
Respondent 38	Country	Sales	Senior Sales Manager

	LOCATION	FUNCTION	ROLE
Respondent 39	Country	Sales	Sales Engineer
Respondent 40	Country	Sales	Sales Engineer
Respondent 41	Country	Sales	Sales Engineer
Respondent 42	Country	Sales	Sales Engineer
Respondent 43	Country	Sales	Sales Engineer
Respondent 44	Country	Sales	Sales Engineer
Respondent 45	Country	Sales	Key Account Manager
Respondent 46	Country	Sales	Key Account Manager
Respondent 47	Country	Sales	Key Account Manager
Respondent 48	Country	Sales	Sales Engineer
Respondent 49	Country	Sales	Sales Engineer
Respondent 50	Country	Sales	Sales Engineer
Respondent 51	Country	Sales	Sales Engineer
Respondent 52	Country	Sales	Key Account Manager
Respondent 53	Country	Sales	Key Account Manager
Respondent 54	Country	Sales	Key Account Manager
Respondent 55	Country	Sales	Key Account Manager
Respondent 56	Country	Sales	Key Account Manager
Respondent 57	Country	Sales	Key Account Manager
Respondent 58	Country	Sales	Key Account Manager
Respondent 59	Country	Sales	Sales Manager
Respondent 60	Country	Sales	Sales Manager
Respondent 61	Country	Sales	Sales Manager
Respondent 62	Country	Sales	Sales Manager
Respondent 63	Country	Sales	Sales Manager
Respondent 64	Country	Sales	Sales Manager
Respondent 65	Country	Sales	Sales Manager
Respondent 66	Country	Sales	Sales Manager
Respondent 67	Country	Sales	Sales Manager
Respondent 68	Country	Sales	Sales Manager
Respondent 69	Region	Sales	Regional Sales Director
Respondent 70	Country	Sales	Sales Manager
Respondent 71	Country	Sales	Country Manager
Respondent 72	Country	Sales	Country Manager
Respondent 73	Country	Sales	Country Manager
Respondent 74	Country	Sales	Country Manager
Respondent 75	Country	Sales	Country Manager
Respondent 76	Country	Sales	Key Account Manager
Respondent 77	Country	Sales	Key Account Manager
Respondent 78	Country	Sales	Key Account Manager
Respondent 79	Country	Sales	Key Account Manager
Respondent 80	Country	Sales	Key Account Manager

	LOCATION	FUNCTION	ROLE
Respondent 81	Country	Sales	Key Account Manager
Respondent 82	Country	Sales	Key Account Manager
Respondent 83	Country	Sales	Key Account Manager
Respondent 84	Country	Sales	Key Account Manager
Respondent 85	Region	Sales	Sales Director
Respondent 86	Region	Sales	Sales Manager
Respondent 87	HQ	Marketing	International Product Manager
Respondent 88	Region	Marketing	Regional Market Manager
Respondent 89	Region	Marketing	Market Development Engineer
Respondent 90	Region	Marketing	Regional Market Manager
Respondent 91	Region	Sales	Key Account Manager
Respondent 92	Region	Top Management	Regional Manager
Respondent 93	Region	Top Management	Regional Manager
Respondent 94	Region	Marketing	Vice President Sales & Marketing
Respondent 95	Region	Top Management	Regional Manager
Respondent 96	Region	Sales	Global Value Chain Engineer
Respondent 97	Region	Marketing	Regional Market Manager
Respondent 98	HQ	R&D	Director R&D
Respondent 99	HQ	Marketing	International Product Manager
Respondent 100	Region	Marketing	Regional Market Specialist
Respondent 101	Region	Marketing	Market Specialist
Respondent 102	Region	Top Management	Regional Manager
Respondent 103	Region	Top Management	Regional Manager
Respondent 104	Region	Top Management	Regional Manager
Respondent 105	Region	Marketing	Director Marketing
Respondent 106	Region	Marketing	Marketing & Sales Director
Respondent 107	Region	Marketing	Regional Market Specialist
Respondent 108	Region	Marketing	Regional Market Specialist
Respondent 109	Region	Marketing	Regional Market Manager
Respondent 110	Region	Marketing	Head of Marketing
Respondent 111	Region	Marketing	Marketing & Sales Director
Respondent 112	Region	Marketing	Marketing & Sales Director
Respondent 113	Region	Sales	Head of Sales
Respondent 114	Region	Marketing	Head of Marketing
Respondent 115	Region	Marketing	Regional Market Manager
Respondent 116	Region	Marketing	Regional Market Manager
Respondent 117	Region	Marketing	Regional Market Manager
Respondent 118	Region	Marketing	Regional Market Manager
Respondent 119	Region	Marketing	Regional Market Manager
Respondent 120	Region	Sales	Senior Sales Manager
Respondent 121	Region	Sales	Sales Manager

4.3. DATA COLLECTION

4.3.1. Data Sources

The empricial data source and setting of this study is a multinational European-based company acting in several different industries on a global scale and in operation since the end of 19th century. Data is collected by two instruments; survey and Xzenon company internal business cases from respective business unit. An online web platform is used to conduct the survey and Xzenon company business cases that are available at company intranet system extracted to an excel file and then the business cases data set is generated.

4.3.2. Survey Sample Selection

This study focuses and obtains data from selected business unit as it has high sales share (>%20) in total company sales and highest share in industrial direct sales (>30%) and also this business unit has a significantly higher and longer experience in using stage gate model in new product development process in the Xzenon company. Also the sample group represents (>10%) of all global BUs, regions and countries actively involving in NPD process of Xzenon company.

In the countries main survey, participant list consisted of, local country manager, sales director, senior sales manager, sales manager, key account manager, sales engineer, sales specialist. In the regions, head of market manager, head of sales, regional sales director, sales director, sales manager, international product manager, regional market manager, market development engineer, key account manager, regional manager, vice president sales and marketing, global value chain engineer, regional market specialist, market specialist, director marketing and in the global headquarters, global key account manager, global value chain manager, global value chain engineer, director research and development, senior product manager, head of business unit, segment manager, regional sales director,

laboratory manager, research and development manager, international product manager, vice president research and development, global manager application process engineering, project and process development manager, international group product manager.

Data for the survey is collected via a digital platform. The main body of the survey is set to collect data on *organization* and *business case level* factors and also Questions 10, 13 and 15 (Appendix 1) are also designed to link survey to main business case data set.

4.3.3. Business Cases

The second data source are Business Cases. Business case is basically steps for capturing a business opportunity, identification, conducting necessary analysis and concept definition (Koen, Bertels & Kleinschmidt, 2014). The Xzenon company processes the business case as a company tool which enables to evaluate and manages all necessary activities to develop new products. A business case can be generated by all business units within the company and also utilized by all involved functions within Xzenon company. It is a written formatted document (data source) uploaded in company intranet system and consists of all initial technical and value based information about a new product idea which allows teams who are processing the business case to use as a source of information. There are variety of business cases in the system monitored and processed by all the teams involved in the company which this study considered as a secondary data source to conduct the research. The final projects status, Go (Active) / No-Go (Stop) decisions for a business case are taken as dependent variables, and analyzed with independent variables. Qualitative independent variables for a business case are, *stage gate status* which indicates a project in identification or qualification, *project owner region* and *country* states the location who coordinates all new product development activities for a specific project, *module and application* present a technical attribute referring to a market specific segment and application field and

solely used by the selected business unit, *development effort* indicates costs, external resources needed, man-days, whether or not the technology is available at Xzenon company. Low effort refers to a new product which is just a modification of an existing one and high effort also refers to a new product which the company does not yet know how to manufacture and needs external expertise, *development time* indicates the time period needed for the development stage in months (6, 12 and 36) predicted in the front-end stage. The quantitative independent variables are, *project status updates* which show the number of revisions made on specific business case and *total potential value of the business case* indicates an estimation of future gain as revenue in euro (€).

A business unit's active and stopped business cases both in identification and qualification stages between 2015 -2018 comprise the data set. Business Cases are drawn from the intranet system of the Xzenon company and 121 business cases are studied. 71 cases are found in the identification stage and 50 are in the qualification stage. All data is clustered, coded and rearranged due to missing values. Finally the main data set consisted of 103 Business Cases generated.

DATA ANALYSIS AND FINDINGS

Both data sources are analyzed individually and then studied jointly through common variables in order to understand the effect on final outcome that is referred to as Go (Active) / No-Go (Stop) decision in identification and qualification stages.

5.1 SURVEY

Descriptives for the survey is given in Figure 5.1. The Locations and Functions are summarized with frequencies and percentages in Table 5.1. The Likert plots are drawn to see the tendency of Business Unit X, Region and Country together (Figure 5.2), individual Locations (Figure 5.3, Figure 5.4 and Figure 5.5) and individual Functions (Figure 5.6, Figure 5.7, Figure 5.8 and Figure 5.9) for the questions Q2-Q12 and Q15.

The questions 13 and 14 are summarized with percentages to find out the most and the least important ranking items Table 5.2 and Table 5.6.

The frequencies and percentages anaylsis for information about “stopped” business cases (Q16) given in Table 5.10.

The questions Q2-Q12 and Q15 are summarized using mean, standard deviation (SD) and median statistics. The Kolmogorov- Smirnov test, histograms, skewness and kurtosis measures are used to assess the normality of each question. Levene’s statistic is used to test for homogeneity (equality) of variances.

The questions Q2-Q12 and Q15 are compared between Locations (Business Unit X, Region and Country) using Kruskal-Wallis test since they are measured in ordinal level and that did not satisfy normality and homogeneity of variances assumptions (Table 5.11). The significant differences for questions Q6, Q7, Q11

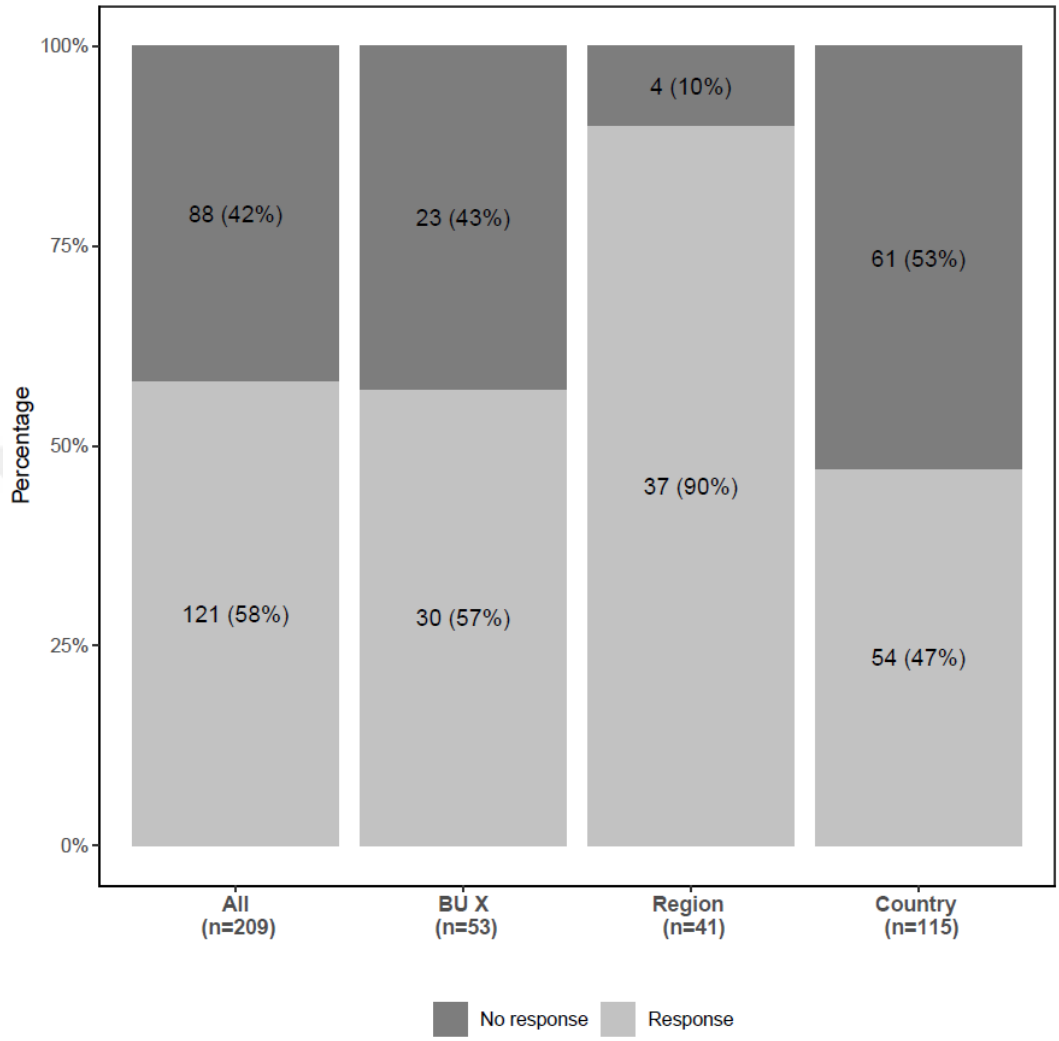
and Q15 between groups are followed by the post-hoc tests to do the pairwise comparisons between groups. For post-hoc tests, Bonferroni adjusted p values are given (Table 5.12).

The questions Q2-Q12 and Q15 are compared between Functions (Table 5.13) using Kruskal-Wallis test for the same reasons above and a significant difference for question 15 between the groups is found. Due to unbalanced sample sizes in groups, the generalized Campbell and Skillings' analysis is performed using the "gao_cs" function in "nparcomp" package of R and the Bonferroni adjusted p-values (Table 5.14) are reported (Konietschke, Placzek, Schaarschmidt & Hothorn, 2015) .

Questions 13 and 14 are ranking questions where participants are asked to compare items to each other by placing them in order of preference. An average ranking is calculated for each answer choice, to evaluate the most preferred answer choice (for Q13; Table 5.3, Table 5.4, Table 5.5 and Q14; Table 5.7, Table 5.8 and Table 5.9).

Chi-square test of association is used to evaluate the differences in proportion of answers given to Q16 according to Location (Table 5.15) and Function (Table 5.16). Fisher's exact test of association is used to evaluate differences in proportion of answers given to Q16 according to Country due to small cell frequencies, as it does not satisfy the assumptions of the Chi-square test.

Figure 5.1 Descriptives for the Survey



In Figure 5.1, the overall response rate of the survey states 58% (121 respondents) out of 209 participants. The highest response rate is from Region 90% (37 respondents) out of 41 participants followed by Business Unit X 57% (30 respondents) out of 53 participants and Country 47% (54 respondents) out of 115 participants. The y-axis represents the percentage & frequency while the x-axis represents the location.

Table 5.1 Survey Respondent Analysis

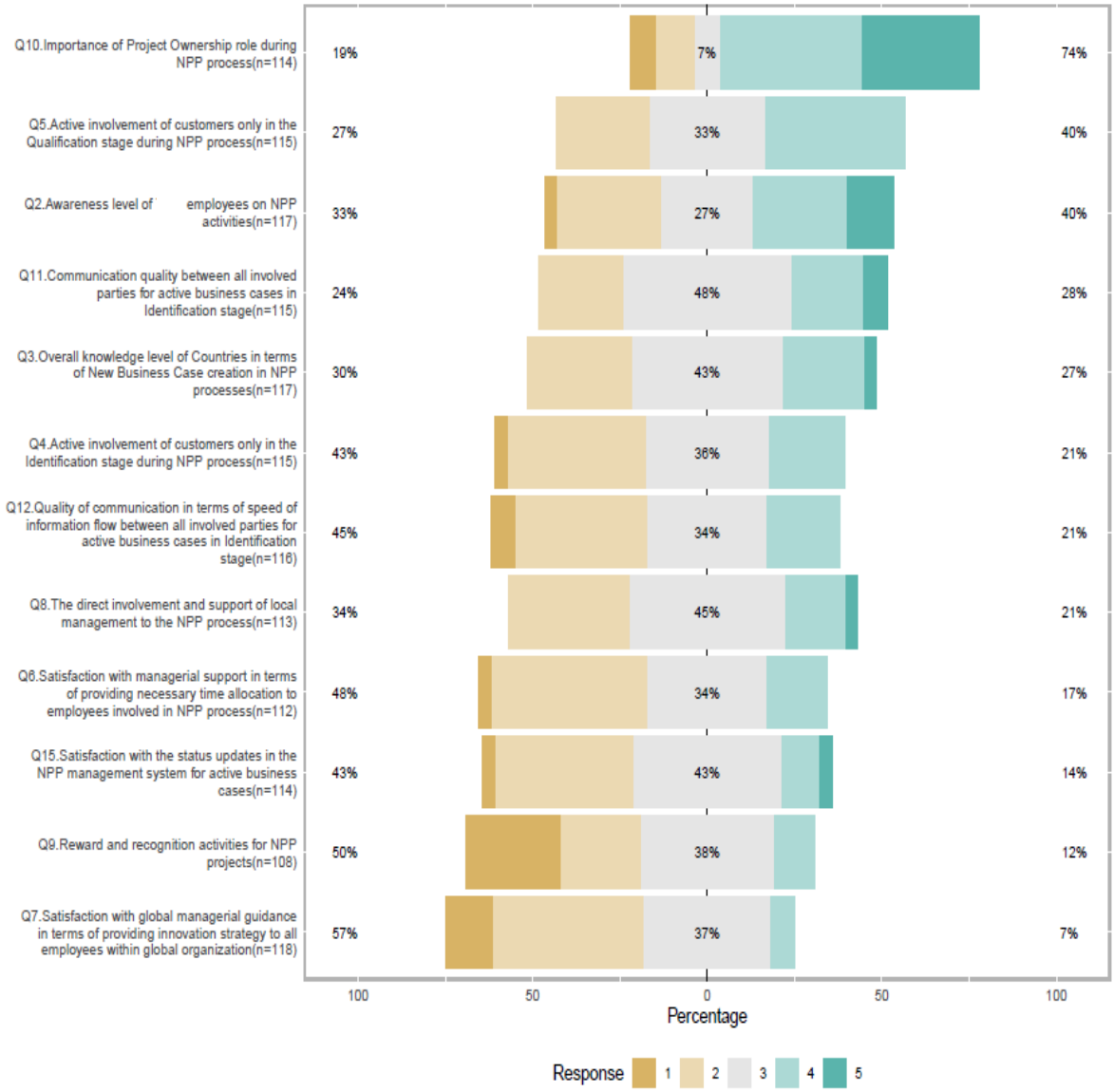
Question 1	Categories	Frequency	Percentage
Location	Country	54	44%
	Region	37	31%
	BU X	30	25%
Function	Sales	75	62%
	Marketing	29	24%
	Top Management	9	7%
	R&D	8	7%
Locations	BU X	30	25%
	Country 1	10	8%
	Region 7	8	7%
	Region 3	7	6%
	Region 4	5	4%
	Region 6	5	4%
	Region 1	5	4%
	Country 3	5	4%
	Region 2	5	4%
	Country 8	5	4%
	Country 18	4	3%
	Country 17	4	3%
	Country 6	3	2%
	Country 19	3	2%
	Country 13	3	2%
	Country 16	2	2%
	Region 5	2	2%
	Country 21	2	2%
	Country 5	2	2%
	Country 7	2	2%
	Country 15	1	1%
	Country 4	1	1%
	Country 10	1	1%
	Country 20	1	1%
	Country 22	1	1%
	Country 23	1	1%
	Country 11	1	1%
	Country 24	1	1%
	Country 2	1	1%

In Table 5.1, for location, the highest frequency belongs to Country (54) followed by Region (37) and Business Unit X (30) while according to function based responses, Sales has the highest frequency (75) followed by Marketing (29), Top Management (9) and R&D (8).

Figure 5.2 The Likert plot for questions between Q2-Q12 and Q15 – (Business Unit X, Region, Country)

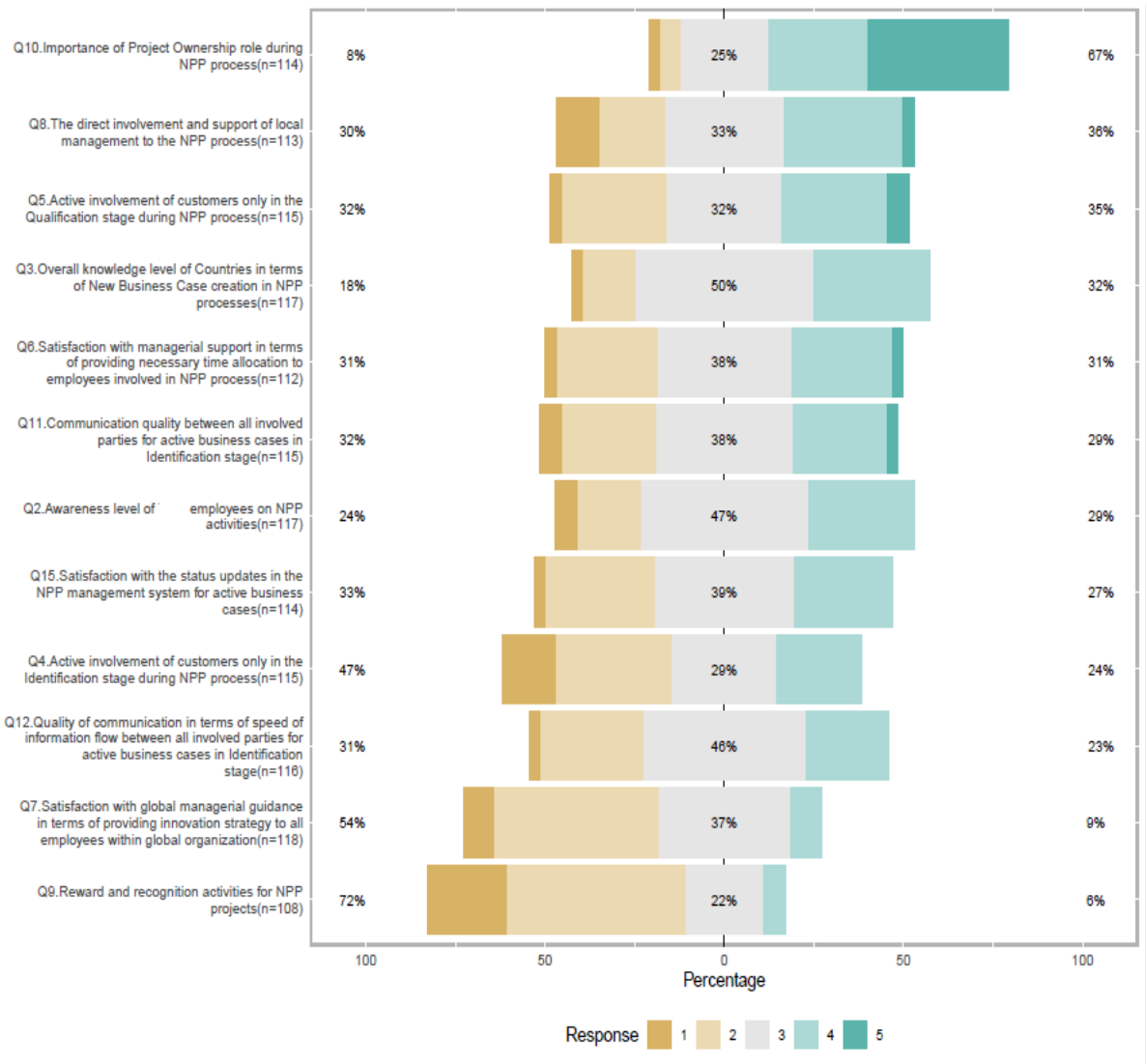
In Figure 5.2, the questions are given in descending order with respect to positive tendency of the answers given to each question. Q10 (project ownership role during NPP) obtained the most positive evaluation while Q9 (reward and recognition for NPP) most negative evaluation by all participants.

Figure 5.3 The Likert plot for questions between Q2-Q12 and Q15 – Business Unit (X)



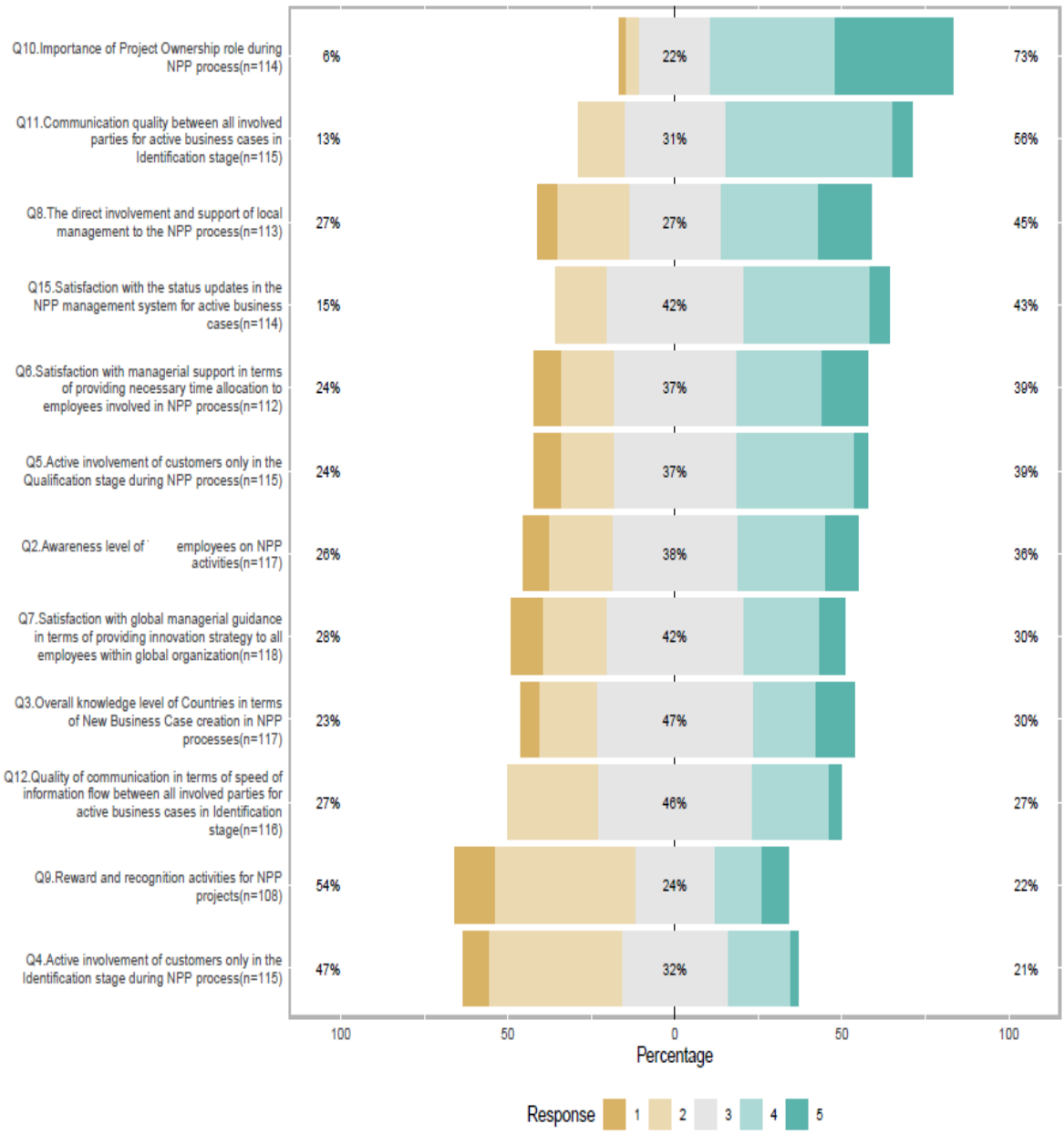
In Figure 5.3, the questions are given in descending order with respect to positive tendency of the answers given to each question. Q10 (project ownership role during NPP) obtained the most positive evaluation while Q7 (satisfaction with global and managerial guidance in terms of providing innovation strategy to all employees within global organization) most negative evaluation by Business Unit X participants.

Figure 5.4 The Likert plot for questions between Q2-Q12 and Q15 – Region



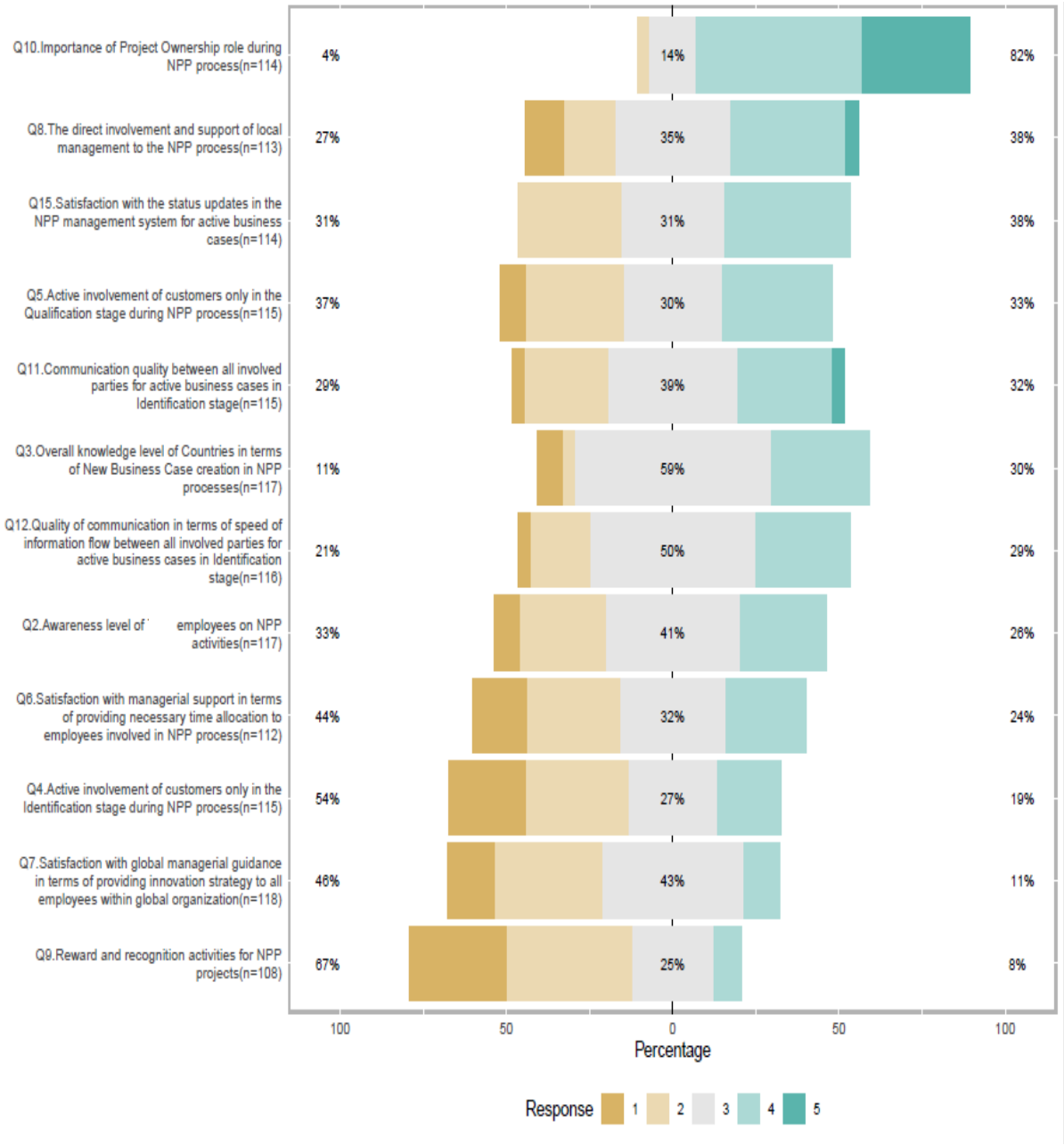
In Figure 5.4, the questions are given in descending order with respect to positive tendency of the answers given to each question. Q10 (project ownership role during NPP) obtained the most positive evaluation while Q9 (reward and recognition activities for NPP) most negative evaluation by region participants.

Figure 5.5 The Likert plot for questions between Q2-Q12 and Q15 – Country



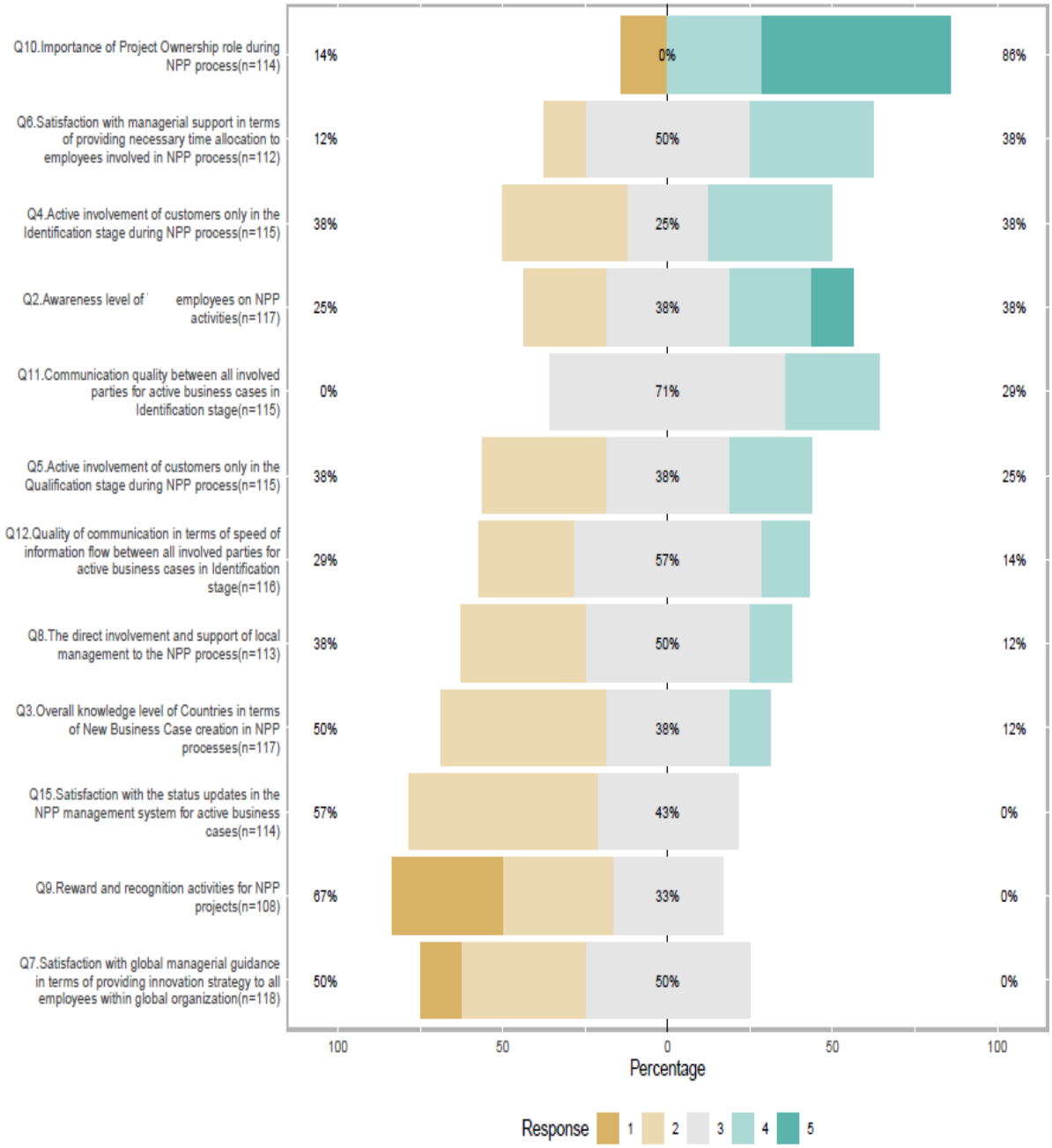
In Figure 5.5, the questions are given in descending order with respect to positive tendency of the answers given to each question. Q10 (project ownership role during NPP) obtained the most positive evaluation while Q4 (The active involvement of customers only in the Identification stage) and Q9 (reward and recognition activities for NPP) most negative evaluation by country.

Figure 5.6 The Likert plot for questions between Q2-Q12 and Q15 – Marketing



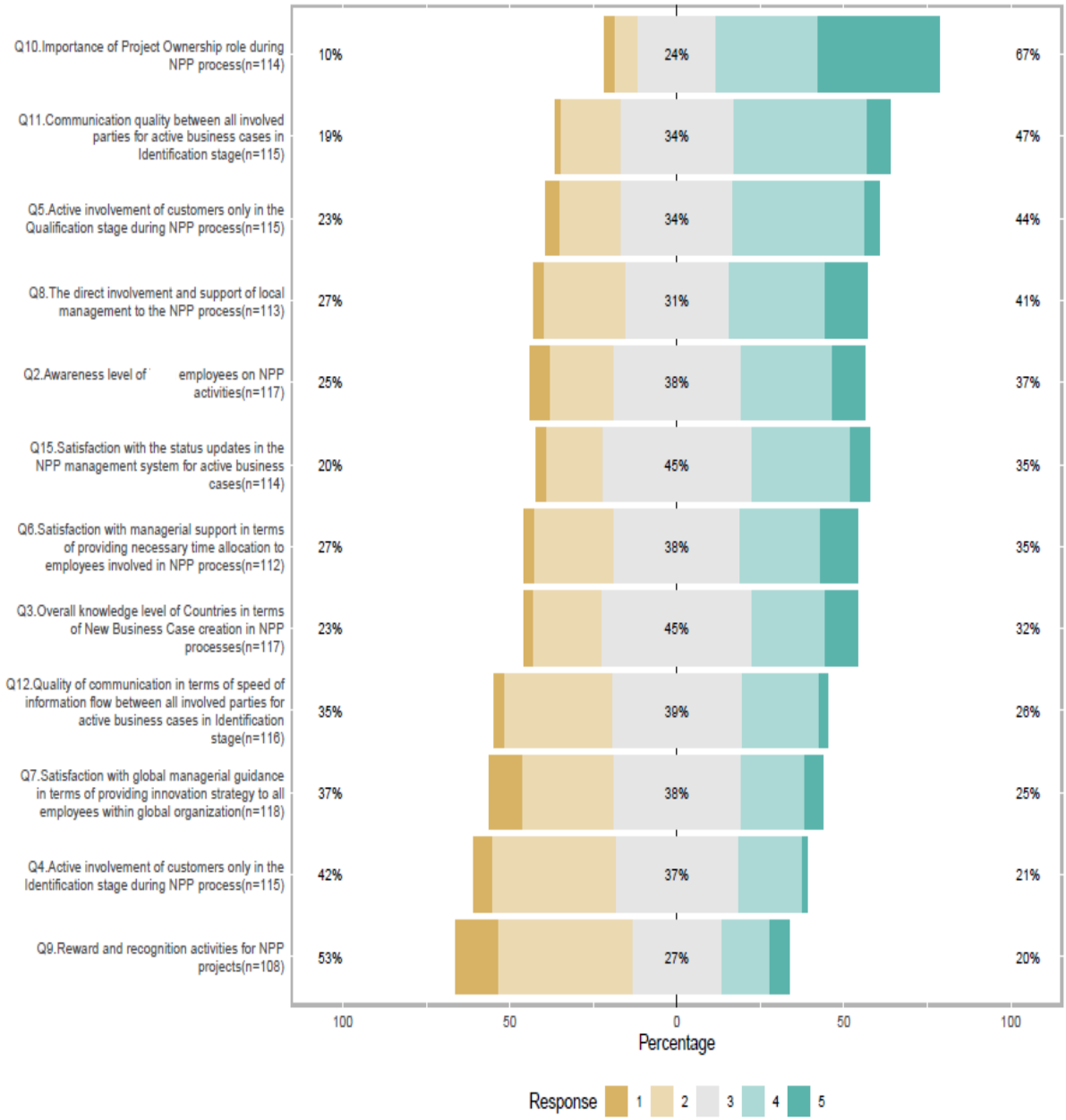
In Figure 5.6, the questions are given in descending order with respect to positive tendency of the answers given to each question. Q10 (Project ownership role during NPP) obtained the most positive evaluation while Q9 (reward and recognition activities for NPP) most negative evaluation by marketing participants.

Figure 5.7 The Likert plot for questions between Q2-Q12 and Q15 – Research and Development



In Figure 5.7, the questions are given in descending order with respect to positive tendency of the answers given to each question. Q10 (project ownership role during NPP) obtained the most positive evaluation while Q7 (satisfaction with global managerial guidance in terms of providing innovation strategy to all employees within global organization for NPP) most negative evaluation by research and development participants.

Figure 5.8 The Likert plot for questions between Q2-Q12 and Q15 – Sales



In Figure 5.8, the questions are given in descending order with respect to positive tendency of the answers given to each question. Q10 (Project ownership role during NPP) obtained the most positive evaluation while Q9 (reward and recognition activities for NPP) most negative evaluation by sales participants.

Figure 5.9 The Likert plot for questions between Q2-Q12 and Q15 – Top Management

In Figure 5.9, the questions are given in descending order with respect to positive tendency of the answers given to each question. Q10 (Project ownership role during NPP) obtained the most positive evaluation while Q7 (Satisfaction with global managerial guidance in terms of providing innovation strategy to all employees within global organization for NPP) most negative evaluation by top management participants.

The common highest positive tendency (by locations; business unit X, region and country) of the answers is given to Q10 which refers to *project ownership*. The survey revealed that the participants strongly believe the crucial role of the *regional headquarters* in terms of managing new product development process. The survey also highlights that global managerial guaidance in terms of providing innovation stratgey (Q7) plus reward and recognition (Q9) are found not satifactory by all participants, the business unit X (located in global headquartes) is not satisfied with global managerial guidance in terms of providing innovation stratgey (Q7) while region in reward and recognition (Q9) and finally country in involvement of the customers during identification especially during idea generation stage (Q4) and reward and recognition activities for NPP (Q9).

The common highest positive tendency (by functions; marketing, sales, research and development and top management) of the answers is given to Q10 which refers to *project ownership*. The survey also revealed that the participants from functions strongly believe the crucial role of the regional headquarters in terms of managing new product development process. The survey also highlights that both sales and marketing functions are not satisfied with reward and recognition (Q9) implementation while both research and development, and top management are also not satisfied with global managerial guiadance in terms of providing innovation stratgey (Q7) and reward and recognition in the research context. The results revealed that, the group located in the global headquarters (business unit X, research and development, top management) are not satisfied with their global guidance for the innovation strategy which they designed.

In question 13, participants are asked to rank the given factors in terms of their impact on the “Go or No-Go” decision from Identification to Qualification stage for a Business Case. In question 14, , participants are asked to rank the given factors in terms of their impact on the “Go or No-Go” decision from Qualification to Development stage for a Business Case.

Table 5.2 Factors that influence "Go or No-Go" decision of a Business Case Question 13 – Locations and Functions

Factors that influence "Go or No-Go" decision of a business case (Question 13)

		Customer Commitment		Total Potential Value of the Business Case		Development Effort		Development Time		Target ICP	
		Most Important	Least Important	Most Important	Least Important	Most Important	Least Important	Most Important	Least Important	Most Important	Least Important
Locations	All Locations	38.0%	14.9%	35.5%	12.4%	9.1%	24.8%	6.6%	23.1%	10.7%	24.8%
	Business Unit X	36.7%	6.7%	43.3%	13.3%	6.7%	20.0%	3.3%	26.7%	10.0%	33.3%
	Region	43.2%	29.7%	24.3%	8.1%	13.5%	32.4%	8.1%	13.5%	10.8%	16.2%
	Country	35.2%	9.3%	38.9%	14.8%	7.4%	22.2%	7.4%	27.8%	11.1%	25.9%
Functions	Sales	38.7%	10.7%	37.3%	12.0%	6.7%	25.3%	6.7%	26.7%	10.7.%	25.3%
	Marketing	37.9%	31.0%	27.6%	10.3%	17.2%	24.1%	6.9%	6.9%	10.3%	27.6%
	R&D	25.0%	12.5%	37.5%	25.0%	12.5%	12.5%	12.5%	12.5%	12.5%	37.5%
	Top Management	44.4%	0.0%	44.4%	11.1%	0.0%	33.3%	0.0%	55.6%	11.1%	0.0%

For all Locations, the most important category are observed in *customer commitment* and *total potential value of the business case* ranking items while intercompany price (ICP), development effort and development time are observed lower in the ranking. The rate of participants which chose customer commitment as the most important ranking item for Q13 is 38% while it is 35.5% for total potential value of the business case.

Evaluation results of Business Unit X on the most important ranking items are total potential value of the business case and customer commitment while development time is observed as the lowest. Business Unit X participants chose the total potential value of the business case as the most important ranking item for Q13 (43.3%), followed by customer commitment (36.7%).

Evaluation results of Region on the most important ranking items are customer commitment and total potential value of the business case while development time is observed as the lowest. Region participants chose the customer commitment as the most important ranking item for Q13 (43.2%), followed by total potential value of the business case (24.3%).

Evaluation of Country on the most important ranking items are total potential value of the business case and customer commitment while development time and development effort are observed as the lowest. Country participants chose the total potential value of the business case as the most important ranking item for Q13 (38.9%), followed by customer commitment (35.2%).

Evaluation of Sales function on the most important ranking items are customer commitment and total potential value of the business case and development time and development effort are observed as the lowest. Sales function participants chose the customer commitment value as the most important ranking item for Q13 (38.7%), followed by total potential value of the business case (37.3%).

Evaluation of Marketing function on the most important ranking items are customer commitment and total potential value of the business case while development time is observed as the lowest. Marketing function participants chose the customer commitment value as the most important ranking item for Q13 (37.9%), followed by total potential value of the business case (27.6%).

Evaluation of R&D function on the most important ranking item is total potential value of the business case and customer commitment while target ICP, development time and development effort are observed as the lowest . R&D function participants chose the total potential value of the busines case as the most important ranking item for Q13 (37.5%), followed by customer commitment (25%).

Evaluation of Top Management function on the most important ranking items are total potential value of the business case and customer commitment while development time and development effort are observed as the lowest. Top Management function participants chose both the total potential value of the business case (44.4%) and customer commitment (44.4%) as the most important ranking items for Q13.

Table 5.3 Q13 Analysis for All Locations

	Mean	Standard Deviation
Total Potential Value	3.60	1.39
Customer Commitment	3.55	1.48
Target ICP	2.71	1.31
Development Effort	2.58	1.28
Development Time	2.57	1.23

For all participants, the most important factors for the decision to move from Identification to Qualification stage for a business case are total potential value of the business case and customer commitment (Mean(SD)=3.60(1.39) and Mean(SD)=3.55(1.48) respectively.

Table 5.4 Q13 Analysis for Business Unit X, Region, Country

	BU X		Country		Region	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Total Potential Value	3.90	1.18	3.48	1.40	3.35	1.77
Customer Commitment	3.77	1.43	3.56	1.49	3.51	1.24
Target ICP	2.57	1.17	2.61	1.27	2.54	1.41
Development Effort	2.20	1.10	2.57	1.28	2.86	1.21
Development Time	2.57	1.36	2.78	1.36	2.73	1.22

For Business Unit X, the total potential value ranking item is observed as the most important item (Mean(SD)=3.90(1.18)) while development effort ranking item is observed as the least important for Q13 (Mean(SD)=2.20(1.10)). For both Country and Region, the customer commitment ranking item is observed as the most important item (Mean(SD)=3.56(1.49)) and (Mean(SD)=3.51(1.24)) while development effort is the least important for Country (Mean(SD)=2.57(1.28)) and target ICP for Region (Mean(SD)=2.54(1.41)).

Table 5.5 Q13 Analysis for Functions

	Marketing		R&D		Sales		Top Management	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Total Potential Value	3.24	1.75	3.75	1.28	3.55	1.44	4.33	.71
Customer Commitment	3.55	1.30	3.38	1.77	3.60	1.41	3.89	1.36
Target ICP	2.69	1.42	3.00	1.31	2.56	1.25	2.00	.87
Development Effort	2.83	1.14	2.38	1.19	2.57	1.25	1.89	1.27
Development Time	2.69	1.31	2.50	1.41	2.72	1.34	2.89	1.05

According to the Marketing department, the most important decision factor to move a business case from Identification to Qualification stage is the customer commitment (Mean(SD)=3.55(1.30)) whereas total potential value of the business case is the most important for R&D department (Mean(SD)=3.75(1.28)) and Top Management (Mean(SD)=4.33(0.71)), customer commitment is the most important factor for Sales (Mean(SD)=3.60(1.41)).

The analysis revealed that functions located in global headquarters (business unit X, research and development, top management) evaluate the *total potential value of the business case* as crucial factor to move a business case from identification to development stage while region, country, sales and marketing approach is firstly to get *customer commitment* for a business case.

Both *total potential value of the business* case and *customer commitment* are significant factors among all given items (total potential value of the business case, customer commitment, target ICP, development time, development effort) for locations and functions to move a business case but the results indicates that there is a different selection priority between global headquarters and regions-countries.

Table 5.6 Factors that influence "Go or No-Go" decision of a Business Case Question 14 - Locations and Functions

Factors that influence "Go or No-Go" decision of a business case (Question 14)

		Strategic Fit		ROI - NPV		Customer Commitment		High Chance For Success		BU - Region - Country Specific	
		Most Important	Least Important	Most Important	Least Important	Most Important	Least Important	Most Important	Least Important	Most Important	Least Important
Locations	All Locations	19.0%	12.4%	19.8%	14.0%	18.2%	9.1%	24.8%	9.1%	18.2%	55.4%
	Business Unit X	16.7%	3.3%	26.7%	16.7%	13.3%	10.0%	16.7%	3.3%	26.7%	66.7%
	Region	27.0%	10.8%	24.3%	10.8%	16.2%	10.8%	13.5%	10.8%	18.9%	56.8%
	Country	14.8%	18.5%	13.0%	14.8%	22.2%	7.4%	37.0%	11.1%	13.0%	48.1%
Functions	Sales	17.3%	13.3%	18.7%	12.0%	18.7%	10.7%	30.7%	8.0%	14.7%	56.0%
	Marketing	24.1%	10.3%	24.1%	13.8%	10.3%	10.3%	13.8%	13.8%	27.6%	51.7%
	R&D	12.5%	12.5%	12.5%	25.0%	25.0%	0.0%	12.5%	12.5%	37.5%	50.0%
	Top Management	22.2%	11.1%	22.2%	22.2%	33.3%	0.0%	22.2%	0.0%	0.0%	66.7%

For All Locations, the most important category is observed in high chance for success which refers to different aspects within research context such as reaching requested market price by cost and margin while BU-Region-Country specific and customer commitment are observed as the lowest. The rate of participants which chose *high chance for success* is 24.8% as the most important ranking item for Q14.

Evaluation of Business Unit X on the most important ranking items are return on investment (ROI) / net present value (NPV) and BU-Region-Country while customer commitment is observed as the lowest. Business Unit X participants chose the *ROI/NPV (26,7%)* and *BU-Region-Country* (26,7%) as the most important ranking item for Q14.

Evaluation of Region on the most important ranking item is strategic fit while high chance for success is also observed as the lowest. Region participants chose the *strategic fit* (27%) as the most important ranking items for Q14.

Evaluation of Country on the most important ranking item is high chance for success while BU-Region-Country specific and ROI/NPV are observed as the lowest. Country participants chose *high chance for success* (37%) as the most important ranking items for Q14.

Evaluation of Sales function on the most important ranking item is high chance for success while BU-Region-Country specific is observed as the lowest. Sales participants chose *high chance for success* (30.7%) as the most important ranking items for Q14.

Evaluation of Marketing function on the most important ranking item is BU-Region-Country specific while customer commitment is also observed as the lowest. Marketing participants chose *BU-Region-Country* (27.6%) as the most important ranking item for Q14.

Evaluation of R&D function on the most important ranking item is BU-Region-Country specific, while strategic fit, ROI/NPV and high chance for success are also observed as the lowest. R&D participants chose *BU-Region-Country specific* (37.5%) as the most important ranking item for Q14.

Evaluation of Top Managemet function on the most important ranking item is customer commitment while BU-Region-Country specific is also observed as the lowest. Top Management participants chose *customer commitment* (33.3%) as the most important ranking items for Q14.

Table 5.7 Q14 Analysis for All Locations

	Mean	Standard Deviation
High chance for success	3.39	1.33
Customer Commitment	3.26	1.22
ROI/NPV	3.12	1.31
Strategic Fit	3.02	1.32
Country/Region/BU specific	2.21	1.59

For all the participants, high chance for success is the most important factor in terms of their Impact on 'Go or No-Go' decision from Qualification to Development stage for a Business Case (Mean(SD)=3.39(1.33)).

Table 5.8 Q14 Analysis for Business Unit X, Region, Country

	BU X		Country		Region	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
High chance for success	3.07	1.20	2.78	1.31	3.32	1.38
Customer Commitment	3.20	1.47	3.00	1.23	3.22	1.32
ROI/NPV	3.27	1.17	3.30	1.25	3.22	1.23

Strategic Fit	3.33	1.09	3.65	1.43	3.05	1.29
Country/Region/BU specific	2.13	1.78	2.28	1.50	2.19	1.61

According to Business Unit X and Country, strategic fit is the most important factor from Qualification to Development stage for a Business Case and the strategic fit is (Mean(SD)=3.33(1.09) and (Mean(SD)=3.65(1.43)) whereas for Region, high chance for success is the most important (Mean(SD)=3.32(1.38)).

Table 5.9 Q14 Analysis for Functions

	Marketing		R&D		Sales		Top Management	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
High chance for success	3.21	1.35	2.88	1.36	2.95	1.30	3.11	1.45
Customer Commitment	3.14	1.41	2.75	1.49	3.16	1.26	3.00	1.41
ROI/NPV	3.10	1.18	3.50	1.20	3.20	1.25	4.11	0.78
Strategic Fit	3.07	1.31	3.25	1.16	3.52	1.36	3.44	1.24
Country/Region/ BU specific	2.48	1.77	2.63	2.00	2.17	1.55	1.33	0.50

According to the marketing department, the most important factor from Qualification to Development stage for a Business Case is high chance for success (Mean(SD)=3.21(1.35)) whereas ROI/NPV is the most important for R&D department and Top Management (Mean(SD)=3.50(1.20)) and (Mean(SD)=4.11(0.78)) and strategic fit is the most important factor for Sales (Mean(SD)=3.52(1.36)).

The analysis revealed that in general, *high chance for success* is the prominent factor while *strategic fit* and *ROI/NPV* are also highlited as crucial factors but there are different and mixed selection priorities to move a business case from qualification to development stage observed for different locations and the functions.

Table 5.10 Survey Question 16 – The Reasons of Stopped Business Cases

Question 16	Categories	Frequency	Percentage
Information about "stopped" business cases	No	76	63%
	Yes	45	37%

In Q16 (The Reasons of Stopped Business Cases), the highest frequency is *No* category (76) and the lowest is *Yes* category (45). The results revealed that the majorty of the respondents think negative about informing the reasons of a stopped bussiness case to the involved parties in terms of transparency and timing.

Table 5.11 Comparisons for Q2-Q12 and Q15 with respect to Locations

	Locations						
	BU X (n=30)		Country (n=54)		Region (n=37)		
	Mean (SD)	M	Mean (SD)	M	Mean (SD)	M	P[1]
Q2.How do you evaluate the awareness level of Xzenon employees on New Product Pipeline (NPP) activities?	3.17 (1.12)	3	3.11 (1.07)	3	3 (0.85)	3	0.875
Q3.How do you evaluate the overall knowledge level of Countries in terms of New Business Case creation in New Product Pipeline (NPP) processes?	3 (0.83)	3	3.13 (1.02)	3	3.12 (0.77)	3	0.709
Q4.How do you evaluate the active involvement of customers only in the Identification (idea generation) stage during New Product Pipeline process?	2.75 (0.84)	3	2.68 (0.94)	3	2.62 (1.02)	3	0.882
Q5.How do you evaluate the active involvement of customers only in the Qualification (testing, sampling) stage during New Product Pipeline (NPP) process?	3.13 (0.82)	3	3.12 (0.99)	3	3.06 (0.98)	3	0.887
Q6.Overall, how satisfied are you with managerial support in terms of providing necessary time allocation to employees involved in New Product Pipeline (NPP) process?	2.66 (0.81)	3	3.22 (1.12)	3	3 (0.92)	3	**0.047**

Q7.Overall, how satisfied are you with global managerial guidance in terms of providing innovation strategy (existence of defined product innovation and technology strategy and the link to corporate business strategy) to all employees within global organization?	2.37 (0.81)	2	3 (1.06)	3	2.46 (0.78)	2	**0.004**
Q8.How do you evaluate the direct involvement and support of local management (Country) to the New Product Pipeline (NPP) process?	2.90 (0.82)	3	3.27 (1.15)	3	2.97 (1.07)	3	0.222
Q9.How do you evaluate reward & recognition activities for New Product Pipeline (NPP) projects?	2.35 (1.02)	2.5	2.64 (1.12)	2	2.13 (0.83)	2	0.139
Q10.How do you evaluate the importance of "Project Ownership" (referring to Regional Market Management) role during New Product Pipeline (NPP) process?	3.81 (1.24)	4	4 (0.96)	4	3.94 (1.07)	4	0.947
Q11.Overall, how satisfied are you with the communication quality considering accurate & transparent information transfer between all involved parties for active business cases in Identification stage?	3.10 (0.86)	3	3.48 (0.80)	4	2.94 (0.95)	3	**0.014**
Q12.Overall, how satisfied are you with the quality of communication in terms of speed of information flow between all involved parties for active business cases in Identification stage?	2.69 (0.89)	3	3.04 (0.82)	3	2.89 (0.80)	3	0.270
Q15. Are you satisfied with the "status updates" in the New Product Pipeline management system for active business cases?	2.71 (0.85)	3	3.34 (0.81)	3	2.91 (0.83)	3	**0.004**

[1]: p values are obtained using Kruskal-Wallis test. M: Median

Kruskal-Wallis test reveals a statistically significant difference (Table 5.11) in questions Q6, Q7, Q11 and Q15 across three Locations (Business Unit X, n=30; Country, n=54; Region, n=37) with p=0.047, p=0.004, p=0.014 and p=0.004 respectively. The significant Kruskal-Wallis test is followed by pairwise comparisons and the results are given in Table 5.12.

Table 5.12 Pairwise comparisons of Locations for questions Q6, Q7, Q11 and Q15

Question	Significant Pairs	p value (Bonferroni adjusted)
Q6	BU X - Country	0.041
Q7	BU X - Country	0.010
	Region-Country	0.024
Q11	Region-Country	0.016
Q15	BU X - Country	0.005

The pairwise comparison analyses revealed that for Q6, Country has a significantly higher positive tendency than Business Unit X (Mean(SD)=3.22(1.12) versus (Mean(SD)=2.66(0.81); p=0.041). For Q7, Country has a significantly higher positive tendency than Business Unit X (Mean(SD)=3(1.06) versus (Mean(SD)= 2.37(0.81); p=0.010) and Region (Mean(SD)=3(1.06) versus (Mean(SD)= 2.46(0.78); p=0.024). For Q11, Country has a significantly higher positive tendency than Region(Mean(SD)=3.48(0.80) versus Mean(SD)=2.94 (0.95); p=0.016). For Q15, Country has a significantly higher positive tendency than Business Unit X (Mean(SD)=3.34(0.81) versus (Mean(SD)=2.71(0.85); p=0.005).

Table 5.13 Comparisons for Q2-Q12 and Q15 with respect to Functions

	Functions								
	Marketing (n=29)		R&D (n=8)		Sales (n=75)		Top Management (n=9)		
	Mean (SD)	M	Mean (SD)	M	Mean (SD)	M	Mean (SD)	M	P[1]
Q2.How do you evaluate the awareness level of Xzenon employees on New Product Pipeline (NPP) activities?	2.85 (0.91)	3	3.25 (1.04)	3	3.16 (1.03)	3	3.11 (1.27)	3	0.612
Q3.How do you evaluate the overall knowledge level of Countries in terms of New Business Case creation in New Product Pipeline (NPP) processes?	3.11 (0.80)	3	2.63 (0.74)	2.5	3.15 (0.95)	3	3.00 (0.87)	3	0.374
Q4.How do you evaluate the active involvement of customers only in the Identification (idea generation) stage during New Product Pipeline process?	2.42 (1.06)	2	3.00 (0.93)	3	2.74 (0.88)	3	2.63 (0.92)	2	0.421

Q5.How do you evaluate the active involvement of customers only in the Qualification (testing, sampling) stage during New Product Pipeline (NPP) process?	2.89 (0.97)	3	2.88 (0.83)	3	3.21 (0.94)	3	3.11 (0.93)	3	0.415
Q6.Overall, how satisfied are you with managerial support in terms of providing necessary time allocation to employees involved in New Product Pipeline (NPP) process?	2.64 (1.04)	3	3.25 (0.71)	3	3.17 (1.01)	3	2.50 (0.76)	2	0.069
Q7.Overall, how satisfied are you with global managerial guidance in terms of providing innovation strategy (existence of defined product innovation and technology strategy and the link to corporate business strategy) to all employees within global organization?	2.50 (0.88)	3	2.38 (0.74)	2.5	2.84 (1.03)	3	2.22 (0.44)	2	0.113
Q8.How do you evaluate the direct involvement and support of local management (Country) to the New Product Pipeline (NPP) process?	3.04 (1.08)	3	2.75 (0.71)	3	3.24 (1.06)	3	2.33 (1)	2	0.093
Q9.How do you evaluate reward & recognition activities for New Product Pipeline (NPP) projects?	2.13 (0.95)	2	2.00 (0.89)	2	2.60 (1.07)	2	2.00 (0.76)	2	0.131
Q10.How do you evaluate the importance of "Project Ownership" (referring to Regional Market Management) role during New Product Pipeline (NPP) process?	4.11 (0.79)	4	4.14 (1.46)	5	3.90 (1.06)	4	3.43 (1.51)	4	0.538
Q11.Overall, how satisfied are you with the communication quality considering accurate & transparent information transfer between all involved parties for active business cases in Identification stage?	3.04 (0.92)	3	3.29 (0.49)	3	3.33 (0.90)	3	2.86 (0.90)	3	0.332
Q12.Overall, how satisfied are you with the quality of communication in terms of speed of information flow between all involved parties for active business cases in Identification stage?	3.04 (0.79)	3	2.86 (0.69)	3	2.91 (0.88)	3	2.43 (0.53)	2	0.299
Q15. Are you satisfied with the “status updates” in the New Product Pipeline management system for active business cases?	3.07 (0.84)	3	2.43 (0.53)	2	3.18 (0.88)	3	2.43 (0.53)	2	**0.019**

M: Median, 1: p values are obtained using the Kruskal-Wallis test

Kruskal-Wallis test revealed a statistically significant difference (Table 5.13) in question Q15 across four Functions (Marketing, n=29; R&D, n=8; Sales, n=75, Top Management, n=9) with p=0.019. The significant Kruskal-Wallis test is followed by pairwise comparisons using the generalized Campbell and Skillings' analysis and the Bonferroni-adjusted p-values are reported in the Table 5.14.

Table 5.14 Pairwise comparisons of Functions for question Q15

Question	Significant Pairs	p value (Bonferroni adjusted)
Q15	R&D-Sales	0.0341
	Top Management-Sales	0.017

The pairwise comparison analyses revealed that for Q15, Sales function has a significantly higher positive tendency versus both R&D and Top Management functions (Mean(SD)=3.18(0.88) versus (Mean(SD)=2.43(0.53); p=0.0341); and (Mean(SD)=2.43(0.53); p=0.017).

Table 5.15 Association of Locations and the answers to Q16

			No	Yes	Total
Locations	BU X	Count	18	12	30
		%	60.0%	40.0%	100.0%
	Country	Count	28	26	54
		%	51.9%	48.1%	100.0%
	Region	Count	30	7	37
		%	**81.1%**	18.9%	100.0%
Total		Count	76	45	121
		%	62.8%	37.2%	100.0%
	Chi-square test		$\chi 2$ (2) =8.165; p value=**0.016**		

The chi-square test for independence indicated a significant association between Location and the answers to Q16, $\chi 2$ (2, n = 121) =8.165, p = 0.016. The people in Region have higher tendency to say NO to question 16 than Business Unit X and Country, 81.1%, 60% and 51.9% respectively.

Table 5.16 Association of Functions and the answers to Q16

			No	Yes	Total
Functions	Marketing	Count	24	5	29
		%	82.8%	17.2%	100.0%
	R&D	Count	4	4	8
		%	50.0%	50.0%	100.0%
	Sales	Count	43	32	75
		%	57.3%	42.7%	100.0%
	Top Management	Count	5	4	9
		%	55.6%	44.4%	100.0%
Total		Count	76	45	121
		%	62.8%	37.2%	100.0%
Fisher's exact test			p value=0.083		

The chi-square test assumption is not satisfied thus Fisher's exact test is employed which indicated that there is no significant association between function and Q16 (p =0.083).

5.2 BUSINESS CASES

The qualitative variables (Table 5.17) are presented with frequencies and percentages.

The association of business case status (stop/active) with qualitative variables, state gate status (I/Q), project owner region, project owner country, module, application, development effort and development time is summarized with frequencies and percentages and Fisher's exact test is employed to test the significance of the association (Table 5.19).

The distribution of the quantitative variables status updates and total potential value of the business case (BC) are investigated using Kolmogorov-Smirnov normality test, quantile-quantile (QQ) and percentile-percentile (PP) plots and histograms. Thus, those variables are summarized with the medians and interquartile ranges (Table 5.18) and compared with respect to groups (stop and active) and also groups

(identfication and qualification) within stage gate status using the Mann Whitney U test (Table 5.20).

In business case study, I defined stop and active as a dependent variable whereas stage gate status, project owner region, project owner country, module, application, development effort, and development time as qualitative independent variables and project updates and total potential value of the BC as quantitative independent variables. Univariate logistic regression analyses (Table 5.21) are employed to determine how each variable affects the status of the project where the unadjusted p values are obtained then multivariate logistic regression model is fitted (Table 5.22) to obtain the adjusted p values.

The models are fitted using logistic regression of the form;
$Prob(y=Active|x)=e^{A(x)}/(1+e^{A(x)})$ where A(x)=constant+sum(variables×regression coefficients). The Odds Ratios (OR) in logistic models are given with 95% confidence intervals.

The relationship between the logit of the project status and total potential value of the BC is not linear which did not meet the linearity assumption for logistic regression thus it is log transformed (log(total potential value)). By recalling that the logit function is logit(p) = log(p/(1-p)), where p is the probability of the outcome given independent variables (Prob(y=Active|x)).

For interpretation of the log transformed explanatory variable (log(total potential value)), “tlm” package in R and the paper (Elswick, Schwartz & Welsh, 1997) are used. The Cook’s distance and standardized residuals were calculated to check for potential influential values (extreme values or outliers) in the continuous predictors. The evidence of multicollinearity between covariates in the multivariable logistic regression model is checked using variance inflation factor (VIF). The model performance is evaluated through accuracy and Hosmer-Lemeshow goodness-of-fit test. Nagelkerke pseudo R squared value for the multivariate logistic regression

model is calculated using the “nagelkerke” function in “rcompanion” package to determine the explained variation.

Table 5.17 Descriptives for Business Cases-Qualitative Variables

Business Cases	Categories	Frequency	Percentage
Project Status	Stop	84	82%
	Active	19	18%
Stage gate Status	Identification (I)	57	55%
	Qualification (Q)	46	45%
Project Owner Region	Region 2	33	32%
	Region 6	23	22%
	Region 7	20	19%
	Region 3	10	10%
	Region 1	10	10%
	Region 4	6	6%
	Region 5	1	1%
Project Owner Country	Country 4	23	22%
	Country 2	20	19%
	Country 6	20	19%
	Country 8	10	10%
	Country 10	7	7%
	Country 5	6	6%
	Country 13	4	4%
	Country 14	3	3%
	Country 11	3	3%
	Country 9	2	2%
	Country 16	1	1%
	Country 15	1	1%
	Country 3	1	1%
	Country 25	1	1%
	Country 1	1	1%
Development Time	short-term (6 month)	40	39%
	mid-term (12 month)	58	56%
	long-term (36 months)	5	5%
Development Effort	Low (L)	20	19%
	Medium (M)	57	55%
	High (H)	26	26%
Module	BY	27	26%
	TA	18	17%
	WH	17	16%
	EX	16	16%
	AE	12	12%
	IN	11	11%
	PT	2	2%

Application	OT	18	17%
	DM	10	10%
	HC	9	9%
	GL	8	8%
	IM	8	8%
	AP	7	7%
	SP	7	7%
	PO	5	5%
	PP	5	5%
	SL	4	4%
	APM	3	3%
	FAP	3	3%
	ND	3	3%
	BB	2	2%
	CM	2	2%
	MA	2	2%
	AM	1	1%
	BR	1	1%
	EM	1	1%
	HR	1	1%
	NVH	1	1%
	SS	1	1%
	TGB	1	1%

The highest frequency for project status is observed in Stop category (84), Stage gate status in Identification (57), Project owner Region 2 (33), Project owner country in Country 4 (23), Development time in Mid-term (58), Development effort in Medium (57), Module in BY category (27) and Application in OT (18).

Table 5.18 Descriptives for Business Cases-Quantitative Variables

Variables	Median	IQR	Min.	Max.
Status Updates	3	4	0	10
Total Potential Value of the BC	T€ 600	T€ 170	T€ 50	€ 7.5 mn

The Status update frequency varies between minimum 0 and maximum 10 in all business cases studied. The total potential value of the business cases indicate a large interval starting from minimum T€50 up to maximum €7.5mn. Both quantitative variables are analysed in Table 5.20.

The results for the association of business case status (stop/active) and the qualitative variables (state gate status (I/Q), project owner region, project owner country, module, application, development effort and development time) are given in Table 5.19. The categories of the development time is redefined such that "6 months" is considered as short term, 12 months is considered as medium term and 36 months is considered as long term.

Table 5.19 Association of Business Case Qualitative Variables

		Stop (n=84)		Active (n=19)		
		Count	Frequency	Count	Frequency	p value1
Stage Gate Status	I	48	57%	9	47%	0.456
	Q	36	43%	10	53%	
Project Owner Region	Region 2	28	33%	5	26%	0.558
	Region 6	18	22%	5	26%	
	Region 7	16	19%	4	21%	
	Region 1	10	12%	0	0%	
	Region 3	7	8%	3	16%	
	Region 4	4	5%	2	11%	
	Region 5	1	1%	0	0%	
Project Owner Country	Country 4	18	22%	5	27%	0.597
	Country 2	16	19%	4	21%	
	Country 6	16	19%	4	21%	
	Country 10	7	8%	0	0%	
	Country 8	7	8%	3	16%	
	Country 5	5	6%	1	5%	
	Country 13	4	5%	0	0%	
	Country 14	3	4%	0	0%	
	Country 11	3	4%	0	0%	
	Country 9	2	2%	0	0%	
	Country 16	1	1%	0	0%	
	Country 15	1	1%	0	0%	
	Country 25	1	1%	0	0%	
	Country 3	0	0%	1	5%	
	Country 1	0	0%	1	5%	
Module	BY	25	30%	2	11%	**<0.001**
	TA	17	20%	1	5%	
	EX	15	18%	1	5%	
	AE	10	12%	2	11%	

	IN	10	12%	1	5%	
	WH	5	6%	12	63%	
	PT	2	2%	0	0%	
Application	OT	14	17%	4	21%	**0.001**
	DM	9	11%	1	5%	
	IM	8	10%	0	0%	
	GL	7	8%	1	5%	
	HC	7	8%	2	11%	
	SP	7	8%	0	0%	
	PO	5	6%	0	0%	
	PP	5	6%	0	0%	
	SL	4	5%	0	0%	
	APM	3	4%	0	0%	
	AP	2	2%	5	26%	
	BB	2	2%	0	0%	
	CM	2	2%	0	0%	
	MA	2	2%	0	0%	
	AM	1	1%	0	0%	
	BR	1	1%	0	0%	
	EM	1	1%	0	0%	
	HR	1	1%	0	0%	
	NVH	1	1%	0	0%	
	SS	1	1%	0	0%	
	TGB	1	1%	0	0%	
	FAP	0	0%	3	16%	
	ND	0	0%	3	16%	
Development Effort	M	48	57%	9	47%	0.738
	H	20	24%	6	32%	
	L	16	19%	4	21%	
Development Time	Medium term (12 months)	50	60%	8	42%	**0.006**
	Short term (6 months)	33	39%	7	37%	
	Long term (36 months)	1	1%	4	21%	

[1]: Fisher's exact test p value

In Table 5.19, the frequencies and percentages of each qualitative independent variable with respect to stop and active groups and the p values of Fisher's exact test statistics are given. Fisher's exact test indicated a significant association

between module and project status (p <0.001). The projects in module WH, have the highest tendency to stay in the active stage among all other modules. Fisher's exact test also indicated a significant association between application and project status (p=0.001) where the projects in application AP, have the highest tendency to stay in the active stage among all other applications. In addition, Fisher's exact test indicated a significant association between development time and project status (p =0.006). By conducting post hoc Fisher's exact test in R, it is found that the projects developed in long term are less likely to stay in business case stop status than the projects developed in medium (p=0.011) or short terms (p=0.014).

The association of business case status (stop/active) with quantitative variables status updates and total potential value of the BC are given in Table 5.20.

Table 5.20 Descriptives for Business Cases

Variables		Stop (n=84)	Active (n=19)	P[1]
Status updates (counts)				
Median (IQR)		3(5)	1(4)	
Min; Max		0;10	0;6	**0.008**
Status updates	I	2(3)	0(1)	
Median (IQR)		0;8	0;1	**<0.001**
Min; Max	Q	4.5(5.5)	4(4)	
		1;10	1;6	0.149
Total potential value of the BC				
Median (IQR)		T€500(T€900)	T€2.000(T€4.000)	
Min; Max		T€50;T€5.500	T€420;T€7.500	**<0.001**
Total potential value of the BC	I	T€355(T€9.175)	T€1.575(T€1.000)	
Median (IQR)		T€50;T€5.500	T€420;T€5.000	**0.008**
Min; Max	Q	T€500(T€790)	T€3.000(T€3.900)	
		T€64;T€5.000	T€600;T€7.500	**<0.001**

[1]: Mann-Whitney U test, I: Identification stage, Q: Qualification stage, the cells represent the medians and interquartile ranges in parenthesis and also the minimum and maximum values.

The distribution of the quantitative variables status updates and total potential value of the BC are right skewed within the stop and active groups. Thus, in Table 5.20, those variables are indicated with the medians and interquartile ranges and the p values are calculated with the Mann-Whitney U test. The Mann-Whitney U test

results in Table 5.20 revealed that the number of project status updates is significantly higher in stopped projects group than in active projects group (Median (IQR)=3(5) versus Median(IQR)=1(4), p=0.008). If I split the status updates into identification and qualification stages, I observe that for identification stage, the number of project status updates is significantly higher in stopped projects group than in active projects group (Median(IQR)=2(3) versus Median(IQR)=0(1), p<0.001) while in qualification stage, there is no statistical significance between stop and active groups.

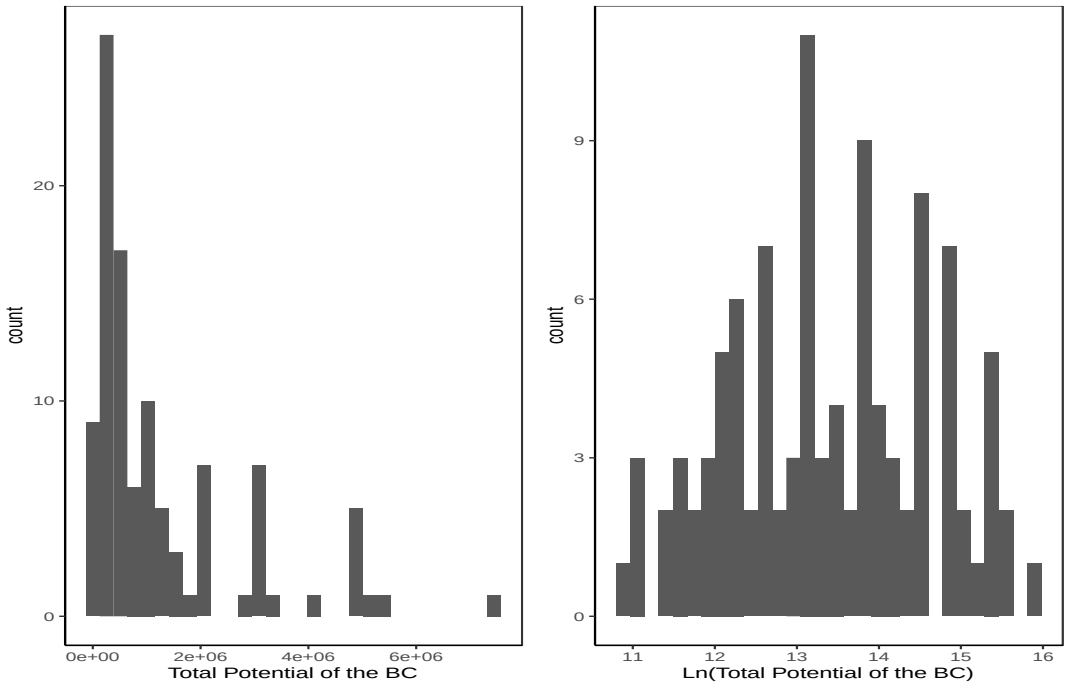
Total potential value of the BC is significantly higher in active projects group than in stopped projects group (Median(IQR)=T€2.000(T€4.000) versus Median(IQR) =T€500(T€900), p<0.001). If I split the total potential value of the BC into identification and qualification stages, I observe that for both stages, total potential value of the BC is significantly higher in active projects group than in stopped projects (Median(IQR)=T€1.575(T€1.000) versus Median(IQR)=T€355 (T€9.175), p=0.008) and (Median(IQR)=T€3.000(T€3.900) versus Median(IQR)= T€500(T€790) versus, p<0.001).

The variables, which are found significant in Tables 5.19 and 5.20, are module, application, development time, status updates and total potential value of the business cases. It is also of interest to determine how those variables affect the business case status (stop/active) of the project, thus I fit univariate and multivariate logistic regression models. Due to the small sample size and the presence of cells where all the observations have the same event status which is known as “separation”, it will cause problems fitting the regular logistic regression model for Module and Application variables (Firth, 1993).

The total potential value of the BC is highly right skewed since some of the projects have very high potential thus, I took the logarithm of that variable to make it more symmetric (Figure 5.10). It is very common in economics to take the logarithm of

the predictor variable since the related coefficient represents the elasticity of the odds (Ramsey & Schafer, 2012).

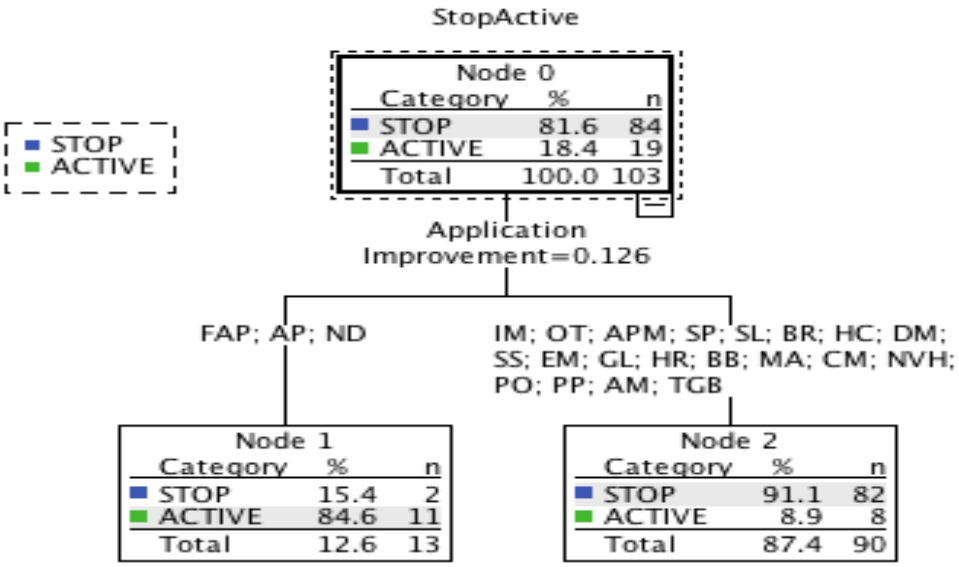
Figure 5.10 Left: Total Potential Value of the BC, Right: Natural logarithm of Total Potential Value of the BC



I employ decision tree algorithm in order to classify both module and application categories.

The analysis revealed two sub-groups for *application* categories (Figure 5.11) and two sub-groups for module categories. (Figure 5.12).

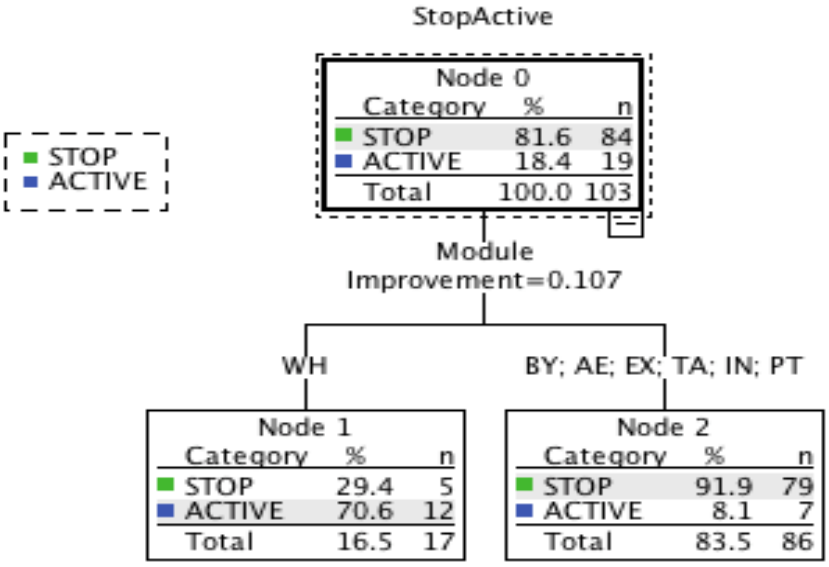
Figure 5.11 Decision Tree for Application to predict Stop/Active



As a result of decision tree, application can be grouped into two sub-categories, the first of which includes FAP, AP, ND and the second includes the remaining categories, finally, I name new variable (FAP, AP, ND) as *application-new*.

I also employ decision tree algorithm in order to explore whether I can group *module* categories. (Figure 5.12).

Figure 5.12 Decision Tree for Module to predict Stop/Active



As a result of this decision tree, module can be grouped into two sub-categories, the first of which includes WH and the second includes the remaining categories, finally, I name new variable (WH) as *module-new*.

Thus, I fit univariate logistic regression models for development time, status updates, log (total potential value of the BC), application-new and module-new. The results of the univariate logistic regression analyses are given in Table 5.21.

Table 5.21 Results of the univariate logistic regression models to estimate project status (Stop/Active)

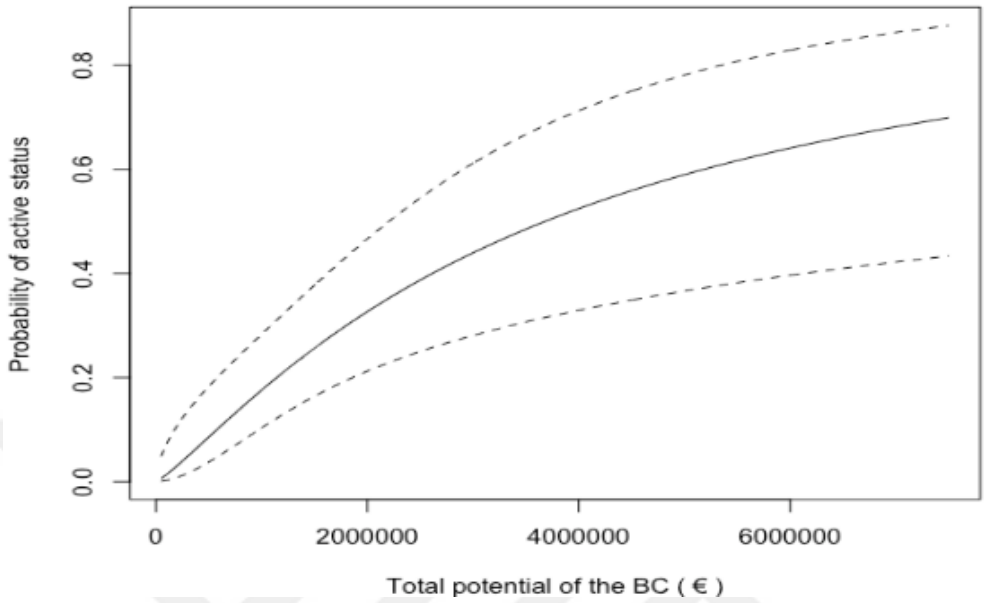
				95% C.I.for OR	
	Coef.	p	OR	Lower	Upper
log (Total potential value-€)	1.184	**<0.001**	3.268	1.798	5.942
Status Updates	-0.287	**0.023**	0.750	0.586	0.962
Development Time (reference=Short)					
medium	-0.282	0.617	0.754	0.250	2.279
long	2.937	**0.014**	18.857	1.820	195.40
Application-new	4.032	**<0.001**	56.375	10.587	300.20
Module-new	3.299	**<0.001**	27.086	7.394	99.229

OR: Odds ratio; CI: Confidence interval, p<0.05, reference: reference category

The result of the univariate logistic regression model reveals that each 2.72-fold increase in the *total potential value of the business case* (Euro) is associated with a change in the odds of being active by a factor of 3.268 (OR=3.268, 95% CI: 1.798-5.942, p<0.001).

The plot (Figure 5.13) illustrates that the probability of *active status increases* as the total potential value of the BC increases.

Figure 5.13 Probability of active status as a function of Total Potential Value of the BC



Dashed lines represent 95% confidence intervals for the measure.

The univariate logistic regression analysis results reveal that as the number of *project updates* increases by 1 unit, the chance of the project to stay in active status decreases by 0.750 (OR=0.750, 95% CI: 0.586-0.962, p=0.023).

According to the results of the univariate logistic regression analysis given in Table 5.21, projects with estimated *long development time* are approximately 19 times more likely to stay in active status than the projects with estimated short development time (OR=18.857, 95% CI: 1.820-195.40, p=0.014).

According to the results of the univariate logistic regression analysis given in Table 5.21, projects with *application-new* (FAP, AP, ND) are approximately 56 times more likely to stay in active status than the projects with remaining application-new (others) (OR=56.375, 95% CI: 10.587-300.20, p<0.001).

According to the results of the univariate logistic regression analysis given in Table 5.21, projects *module-new* (WH) are approximately 27 times more likely to

stay in active status than the projects with remaining module-new (others) (OR=27.086, 95% CI: 7.394-99.229, $p<0.001$).

The univariate logistic regression considers the effect of each independent variable on the dependent variable without adjusting for other variables thus, multivariate logistic regression is employed to determine the effects of each variable including other variables in the model (Table 5.22).

The development time, status updates, total potential value of the business case, application-new and module-new are considered in multivariate logistic regression model analysis.

In Model 1; only development time, status updates, total potential value of the business case, in Model 2; also included is application-new in addition to the variables in Model 1, in Model 3; also included is module-new in addition to the variables in Model 1 and in Model 4 all variables are included.

Table 5.22 Results of the multivariate logistic regression to estimate project status (Stop/Active)

	Model 1					Model 2 (only module)				
Variables	Coefficient	p	OR	OR lower 95 % CI	OR upper 95 % CI	Coefficient	p	OR	OR lower 95 % CI	OR upper 95 % CI
Constant	-18.45					-17.76				
Status updates	-0.249	0.074	0.779	0.593	1.024	-0.189	0.251	0.828	0.6	1.142
Development time (ref=short)										
Medium	-1.006	0.157	0.366	0.091	1.475	-2.032	0.031	0.131	0.021	0.831
Long	2,09	0.122	8.087	0.571	114.48	1.228	0.472	3.415	0.12	97.02
log (Total Potential of the BC)	1.303	<0.001	3.682	1.866	7.264	1.208	0.003	3.348	1.514	7.403
Application-new	-					-				
Module-new	-					3.098	0.001	22.149	3.747	130.93
Model Criteria										
Accuracy	84.5					81.6				
Nagelkerke R^2	0.473					0.633				
AIC	71.644					59.666				
BIC	84.818					75.474				
Consistent AIC (CAIC)	89.818					81.474				

	Model 3 (only application) - BEST MODEL					Model 4 (both module and application)				
Variables	Coefficient	p	OR	OR lower 95 % CI	OR upper 95 % CI	Coefficient	p	OR	OR lower 95 % CI	OR upper 95 % CI
Constant	-18.73					-18.43				
Status updates	-0.167	0.311	0.846	0.612	1.169	-0.169	0.316	0.845	0.607	1.175
Development time (ref=short)										
Medium	-1.541	0.073	0.214	0.04	1.153	-1.809	0.057	0.164	0.025	1.056
Long	1.167	0.512	3.213	0.098	105.07	1,15	0.523	3.159	0.093	107.39
log (Total Potential of the BC)	1,27	0.003	3.561	1.561	8.123	1.248	0.003	3.482	1.518	7.986
Application-new	3.554	<0.001	34.949	4.973	245.61	2.385	0.114	10.864	0.566	208.51
Module-new	-					1.391	0.334	4.018	0.239	67.483
Model Criteria										
Accuracy	90.3					81.6				
Nagelkerke R^2	0.652					0.66				
AIC	57.582					58.742				
BIC	73.39					77.185				
Consistent AIC (CAIC)	79.39					84.185				

The results in Table 5.22 reveals that the final model is;

Prob(y=Active|x) = eA(x) /(1+eA(x)) where;
A(x)= -18.73 – 0.167 Project updates - 1.541 (Development time=Medium) + 1.167 (Development time=Long) + 1.27 log (Total potential value of the BC) + 3.554 (Application-new=FAP, AP, ND)

The Nagelkerke R Square of the multivariate logistic regression model is 0.652, which means that the model explains 65.2% of the variability in the project's status. The goodness of fit of the model is measured using Hosmer-Lemeshov test (5.414 based on 8 degrees of freedom, p=0.712), thus, the model has a good fit. The model also has a good predictive power of stop/active status with an accuracy of 90.3% and can be calculated to find the probability of staying active for the business case based on project status updates, development time, total potential value of the BC and application-new.

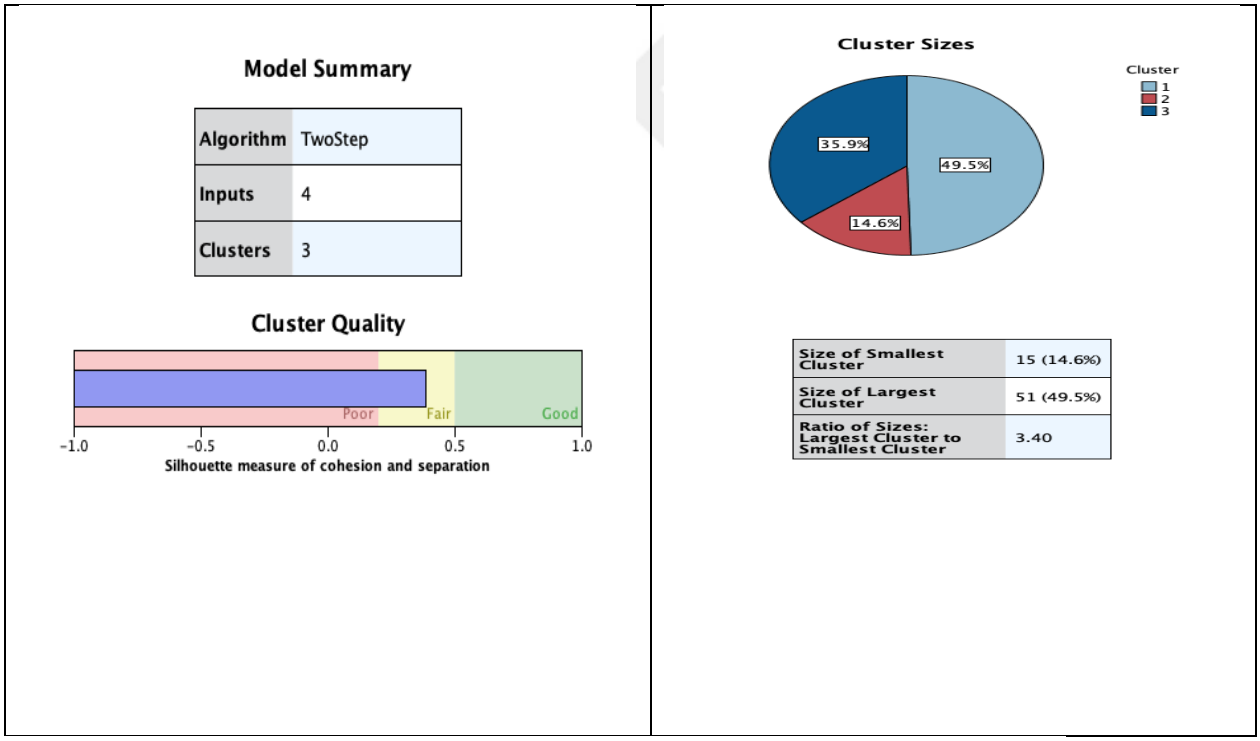
The multivariate logistic regression analysis of model 3 reveals that *log total potential value of the business case* is a significant factor among others. Each 2.72-fold increase in the total potential value of the business case (Euro) is associated with a change in the odds of being active by a factor of 3.561 (OR=3.561, 95% CI: 1.561-8.123, p=0.003) given development time, project updates and application-new.

Additionally it is found that *application-new* is also a significant factor to predict business case status. Business cases with application-new (FAD-AP-ND) are approximately 34.95 times more likely to stay in active status than the business cases with remaining application-new (others) (OR=34.95, 95% CI: 4.973-245.61, p<0.001) given development time, project updates and total potential value of the project.

5.3. SYNTHESIS OF SURVEY AND BUSINESS CASES

The variables which are significantly related with Stop/Active status of the project are considered for cluster analysis which are total potential value of the business case, development time, project updates and application-new based on the statistical model. I employed two-step cluster analysis as those are a mixture of categorical and numerical variables. As a result of cluster analysis, I obtained three clusters with a fair clustering quality (Figure 5.14 a). The largest cluster size is 51 and the smallest cluster is 15 (Figure 5.14 b), where the ratio of clusters is 3.40.

Figure 5.14 a) Silhoutte measure of cohesion and separation, b) Cluster sizes and ratio of sizes



The clusters are shown in Figure 5.15 with the variables ordered with respect to predictor importance. The most effective variable for clustering is the development time followed by application-new, log (total potential value of the business case) and project updates.

Figure 5.15 Clusters

Clusters

Input (Predictor) Importance

1.0 0.8 0.6 0.4 0.2 0.0

Cluster	1	2	3
Label			
Description			
Size	49.5% (51)	14.6% (15)	35.9% (37)
Inputs	Development Timemonths 12.00 (100.0%)	Development Timemonths 12.00 (46.7%)	Development Timemonths 6.00 (100.0%)
	Application2 Other (100.0%)	Application2 FAP,AP,ND (86.7%)	Application2 Other (100.0%)
	potentiallog 13.43	potentiallog 14.37	potentiallog 12.91
	ProjectUpdates 3.73	ProjectUpdates 2.00	ProjectUpdates 3.81

The crosstabulation of clusters with stop-active status is given in Table 5.23.

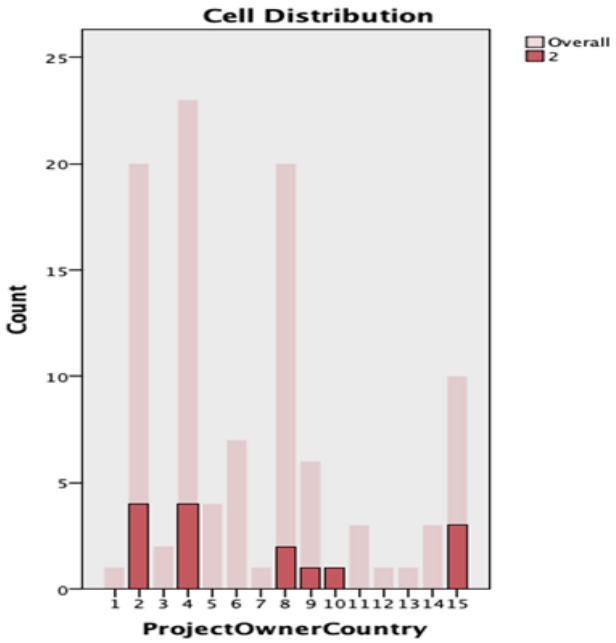
The new clusters are investigated whether they are associated with Stop or Active status of the project using Fisher's exact test (Table 5.23). The results which are given below shows that cluster 2 has significantly higher active project rate than the two other clusters (proportion of active projects in cluster 2=0.867) (Fisher's exact test p value=<0.001). Therefore, I only investigated the countries in cluster 2.

Table 5.23 Crosstabulation of clusters with stop-active status

			StopActive		
			STOP	ACTIVE	Total
Clusters	1	Count	50	1	51
		%	98.0%	2.0%	100.0%
	2	Count	2	13	15
		%	13.3%	**86.7%**	100.0%
	3	Count	32	5	37
		%	86.5%	13.5%	100.0%
	Total	Count	84	19	103
		%	81.6%	18.4%	100.0%
Fisher's Exact Test			p value < 0.001		

The Fisher's exact test indicated that there is a significant association between clusters and Stop/Active (p <0.001). The probability of Cluster 2 projects remaining in Active is higher versus Cluster 1 and Cluster 2 (86.7% versus 2.0% and 13.5% respectively).

Figure 5.16 Cell distribution for Cluster 2



Each number in Figure 5.16 represents a country; (2) Country 2, (4) Country 4, (8) Country 6, (9) Country 5, (10) Country 3 and (15) Country 8. As a result of cluster analysis, countries that are in cluster 2 (Figure 5.16) are similar to each other in terms development time, application-new, total potential value of the business case and project updates.

It is observed that there is a similarity between Cluster 2 countries in terms of giving positive answers in the survey for Q10 (Project ownership role during NPP) and Q11 (Communication quality between all involved parties for active business cases in Identification stage).

It is observed that there is a similarity between Cluster 2 countries in terms of giving positive answers in the survey for Q13 (Please rate the importance level of the factors given below in terms of their impact on "Go or No-Go" decision from Identification to Qualification stage for a Business Case). Customer Commitment and Total Potential Value of the Business Case factors are found similar for Cluster 2 countries.

It is observed that there is a similarity between Cluster 2 countries in terms of giving positive answers in the survey for Q14 (Please rate the importance level of the factors given below in terms of their Impact on "Go or No-Go" decision from Qualification to Development stage for a Business Case). Customer Commitment and High Chance for Success factors are found similar for Cluster 2 countries.

It is observed that there is a similarity in terms of Yes (35% frequency) and No (65% frequency) answers in Q16 (Do you think the reasons of "stopped" business cases are informed to all involved parties as transparent and at the right time?) within Cluster 2 countries.

DISCUSSION

The main focus of this study is to understand the leveraging of reverse knowledge transfer (knowledge as a resource, based on RBV approach) between MNC headquarters and its subsidiaries through business case management in NPD process especially by focusing on front-end stage.

In this section, this study discusses on front-end success factors emphasized in the extant literature with the findings derived from survey. This study also argued on conducted data analysis for the selected business cases (secondary data set) and provided a statistical model that calculates the business case status regarding the probability of staying in active. In addition, a cluster analysis is conducted based on independent variables extracted from the best statistical model (Table 5.22) to explore the countries that have similarities in running active business cases.

6.1 DISCUSSION ON SURVEY RESULTS

In this section, I discussed the independent variables given in our conceptual model (Figure 4.5) created by reviewing literature. The model consists of three main variables and selected sub variables in which this study only considered two of the main variables, organization and business case level.

6.1.1. Organization Level Variables

6.1.1.1. Innovation Strategy

A company's strategy outlines how the organization will maintain its goals, considering the threats and opportunities in the environment, and the limitations of its resources and capabilities (Nandakumar et al. 2010).

Regarding the Strategy and Planning category, the absence or inadequate strategic planning has been found to strongly influence the front-end of the NPD process in which the product strategy is defined. These activities are crucial to the performance of the process due to defining right new products that make the business competitive and generate revenue therefore, poor execution of these activities leads to additional NPD problems (Costa et al. 2013).

The strategy which is adaptable with the vision gives a significant guide to contribute in both incremental and radical development activities (Koen et al. 2014). The companies that manage their operations quite well coordinate their business and product strategy when recognizing unused openings in their front-end (Koen et al. 2001).

Front-end stage is connected to the company business strategies, competitive variables, organizational abilities and maturity of technologies to be utilized. The entire innovation process should be harmonized with business strategy in order to empower the new product pipeline running steadily. Continuous successful product development can only be realized when front-end activities are completed with organizational capabilities of the company (Kohen et al. 2001).

The innovation is uncovered as a center figure for a sustained trading advantage in respective markets (Dodgson et al. 2008), so innovation strategy ought to become the most important strategy in a company (Ettlie, Bridges, & O'Keefe, 1984; Cottam, Ensor, & Band, 2001; Cooper and Kleinschmidt, 2007; Dodgson, Gann, & Salter, 2008). The synergy of integrating and synchronization of the innovation strategy with corporate strategy makes the company to be competitive on the respective international markets. The relationship between the stratgey for organizational innovation and the front-end performance is highlighted in the extant literature (Claver, Llopis, Garcia, & Molina, 1998; Ho & Tsai, 2011). The capability of interfacing the front-end exercises with company strategy can lead to the superior performance (Clercq, Menguc, & Auh, 2009; Cottam et al. 2001).

The innovation strategy is one of the foremost noteworthy components of an inventive organization, which gives direction and encompasses the main corporate goals (Anthony, Eyring, & Gibson, 2006). The alignment of innovation strategy with the overall corporative strategy will provide a company potential to respond in an appropriate way to customer needs (Cottam et al. 2001; Dodgson et al. 2008; Goffin & Mitchell, 2005).

During the literature review, the positive impact of having an innovation strategy and its interconnectivity with company global business strategy on the front-end activities is strongly highlighted.

The descriptive analysis showed that despite the existence of innovation strategy which aligns with extant literature, the positive tendency of the answers given to the question was low. The participants' input also revealed that the communication of the innovation strategy is unclear and managerial guidance is not sufficient and innovative thinking should be more visible in the employee daily routines as a company culture. It is quite obvious from the input that NPD process is known by the research context, nevertheless, while reverse knowledge transfer is in place on front-end stage, the knowledge transfer from headquarters to subsidiaries in reference to innovation strategy is fuzzy. Another finding revealed that top management, respective business unit and R&D functions which are basically located in headquarters also do not have the satisfaction for the deployment of the innovation strategy within the global organization. The respondents shared that;

**Innovation and technology strategy is available, but not all employees know the details, especially on global level.*
**No claer communication, no guidance.*
** Product and technology innovation strategy is rather unclear in the company. It should be more linked with market trend in mid & long term than coping competitors' products for short term business.*
**Innovation strategy is not clear.*

**I never heard the innovation strategy and the link to corporate business strategy.*
**Strategies are communicated.*
**Company strategy is not fully explained to employees.*

6.1.1.2. Absorptive Capacity

The ability to determine external new knowledge and its value then covert it into a company capability that can be used for various business purposes through the absorption process, is called as absorptive capacity (Schreiber et al. 2011).

The purification of product ideas and concepts are driven by participation of external and internal actors and customer involvement is one of the foremost essential actors. Recognizable proof of customer needs ought to be well inspected before the real development begins, and early appraisal of customer needs strongly supports the product success. Additionally, customer involvement can permit new supportive perspectives that development groups work on. The conventional or so-called "closed" models of the innovation process were shockingly open within the front-end, concerning inbound activities such as supplier or customer involvement (Florén, H., & Frishammar, J., 2012).

Customer association can unequivocally make strides for product concepts (Cooper & Kleinschmidt, 1987) and variety of researches suggest that successful innovative activities develop together with customer request (Quinn, 1985; von Hippel, 1982). In general, dedication of customers is discernibly missing in numerous new product projects, particularly on the front-end activities (Cooper, 1997). The project team members can furthermore acquire new and differing points of view by close and frequent contact with customers. The engagement of customers' on front-end stage helps the project team better understand both current and future customer needs, possible market size and growth (e.g., Chandy & Tellis, 1998).

Furthermore, customers can act not only as buyers and users but as well as essential sources of knowledge. Considering the Web, customers are increasingly engaged in an active and open discourse with product and service manufacturers. Customers ended up being co-developers of personalized practices. Companies and foremost customers have common parts in training, forming expectations and creating market acceptance for products and services. (Prahalad & Ramaswamy, 2000, p.80). Information from focus group interviews, close and direct contact with customers and lead users, can help organizations in distinguishing the proper product ideas and cut down the timing in front-end stage (Kim & Wilemon, 2002a).

Customer and market knowledge is utilized early on to set scope for product (target markets, customer segments, features, cost, price). Early concept and other feasibility inital models are planned, tested, and completed on front-end so that there are no surprises afterward (Khurana & Rosenthal, 1998). Customer integration into product testing or application development, supports improving products or services while preventing potential failures. Companies that involve customers more in their ideas and development processes, despite the high degree of uncertainty of these innovations, increase the successful launch of the product to the market.

The results indicated in alignment with literature that customer involvement in both identification and qualification stages are considered as a vital activity in order to get technical and commercial confirmation on the front-end process. For Go or No-Go decision, the customer involvement on identification stage which refers to market, customer input by subsidiaries and utilization of idea generation, scoping and business case creation by regions and also qualification stage which refers the evaluation of uploaded business cases by cross-functional executive review committee revealed high importance on the front-end stage. The findings indicated that customers are usually willing to test the product prototypes which supports the literature if customer commitment is discussed and provided in the identification stage. The satsisfaction level of involving customers especially in identification

stage was lower than qualification stage which supports the literature in terms of having the customer involvement in the very early stage. The speed of the decision-making process is important in the product development as highlighted by the respondents in order to keep the customer interest on a high level during the NPD process. The respondents shared that;

**Customer involvement is only one approach to New Product Development.*
**Most ideas are based on customer requests.*
**Usually customer requests are the initial starting point for a business case but active involvement does not start before "qualification" or even rather "development".*
**We need to change our mindset internally to approach product development into a more agile process, more incremental development steps with customer checking along the way. Avoiding large and long development steps, losing customer interest and failing in the project.*
**I state it over and over again - let the customer be a well honoured Partner in terms of "idea generation".*
**Interaction between customer could be improved. Commitment of the customer is essential for the success of the Project.*
**I believe customer involvement will be necessary for the entire process to make sure of their techncial and commercial confirmation but with a reasonable development speed.*
**Customer involvement is necessary for the entire NPP process to make sure technical & commercial confirmation.*

6.1.1.3. Top Management Involvement

The positive impact and the importance of top management involvement in early stages of NPD projects are highlighted in different researches in the literature such as Poskela & Martinsuo (2009) and Lemmerer, Zapilko & Menrad (2015).

Front-end activities are called as critical to make sure that decisions support the best interests of the company while fulfilling the long-term strategic targets and in this stage the role of the top management is expected as communicating strategic expectations and setting directions while they also have an direct impact particularly through resource allocation and task assignment, sufficient freedom to act on the front-end for group motivation (Poskela & Martinsuo 2009). Another vital role of top management is to encourage and motivate the creativity and innovativeness to reach out the company strategic goals.

The degree that top managers are involved with front-end activities by setting a concrete commitment and support for product championing and active participation is found as a solid contributor on the front-end success. Top management involvement is one of the most crucial organizational attributes as success factor on the front-end stage. They play a central and integral role in reviewing projects, active participation in decision-making process and set their commitment on front-end activities (Koen, Bertels & Kleinschmidt, 2014).

The company should manage the legitimization system where the idea development takes place. Failure to do so may result in the rejection of attractive ideas and concepts due to a lack of legitimization, or, on the contrary, pushing inadequate ideas and concepts too far for political reasons. There are variety of management measures to point out these two issues and they apply to both incremental and radical front-end projects. First, top management support can reduce such problems because it can handle resistance to change and in addition have the capability to mobilize corporate support and clarify their development goals. Second, cross-functional collaboration can allow for better sanctions for rising ideas and concepts in an organization (Florén, H. & Frishammar, J., 2012).

Top management involvement is one of the decisive factors for new product's success and failure (Cooper & Kleinschmidt, 1987; Gupta & Wilemon, 1990; Maidique & Zirger, 1984). According to Quinn (1985), due to top management

ownership and desire to innovate while managing the value system and the culture drives the continuous innovation. The support activities of top management are quite obvious and clear for validated projects comparing the ones on the front-end stage due to higher uncertainty level, therefore, it is important to decide which fuzzy ideas and consequently the resources will draw attention and which will (Kim & Wilemon, 2002a) not.

In the research context, the results are considered and evaluated according to local subsidiary management level. All the participants' view indicated an above average result in terms of direct involvement and support of local management while regions, countries, sales, marketing functions shows higher positive evaluation in contrary to global top management, Business Unit X and R&D where they all located in global headquarters. The top management satisfaction level on deploying innovation strategy from global headquarters to subsidiaries was low but in the meanwhile results indicates that their satisfaction level on local management involment in NPP process is also low which might be perceived as a conflict. There were a range of comments made by our respondents regarding the role of *management support* which provided positive evidence for the new product pipeline process;

**All general managers are very active about supporting their own business cases.*
**Very engaged.*
**Our management team is always supporting and following this subject therefore planning is also quite good.*
**Most countries' managers I know support this very actively.*
**Variation is very strong, depends on the Country and Managers.*
**Local Management is providing the BC document than the process ends.*

6.1.1.4. Resource Availability

As stated by Florén et al. (2017), the front-end stage is finalized with go or no-go decision which needs to be considered of market realities, available resources and business plans.

In the extant literature, resources are considered to support front-end activities. And companies that are successful allocate adequate resources to support important activities such as discovery, idea generation and project development. In spite of the fact that the results are sometimes difficult to observe or need some time to appear, providing necessary resources which means providing enough funds for these activities is crucial for a successful front-end process (Koen, Bertels & Kleinschmidt, 2014).

Necessary financing, human resource and time allocation should be provided as the innovation projects run forward when needed. Koen et al. (2014) highlights that in the stage-gate model each project should receive necessary resources after approval for the next stage, otherwise the approval will be meaningless and project will be in stand by status with other projects which will take time to reach the market.

According to the Cooper & Kleinschmidt (1987), the new product research studies highlight limited amounts of time and money provided to early critical steps. The outcome of front-end activities can be clustered into product definition, time, and human resources dimensions that can influence the focus, development time, and the organizational relationship in each next development phase.

The required time for screening an opportunity is one of the key performance indicators on front-end activities (Kim & Wilemon, 2002a).

According to the findings, the satisfaction level of managerial support in terms of providing necessary time allocation to employees in new product development

showed an average level by all the respondents. Top management, respective business unit and marketing responses indicated on lower satisfaction level on the contrary to country higher response level. In general, it is perceived that top management, respective business unit and marketing expect even more time allocation in countries as a resource in NPD process which is in alignment with extant literature. The respondents indicated that;

**I am satisfied with the management measures that were taken in the last years in order to increase the active selling time of the sale team and consequently the new product development process.*
**Our management team is always supportive and following this subject, therefore planning is also quite good.*
**Time is OK, focus is improving.*
**Team is getting freedom to act on new product ideas.*
**Time allocation should be linked with the market dynamism. In some markets new product development process takes 3 months to get in the testing phase while for a multinational projects, it takes 18 months.*

6.1.1.5. Cross-Functional Team Collaboration

Cross-functional cooperation is emphasized by Florén et al. (2017) as one of the essential success factors on front-end activities which represents the degree of multiple-organizational functions participation in new product development effort by providing proper task analysis, managing uncertainty, screening of ideas, maintaining the existence of ideas and generating new knowledge.

In the extant literature it is indicated that low level of cross-functional integration and involvement is highlighted as one of the failure factors in new product development process on the contrary to that higher integration of different functions including sales has a positive impact on the process (Markovitch et al. 2015). Besides R&D and marketing function roles on front-end stage, integration of sales

function has a significant and positive impact on overall new product development project performance (Ernst, Hoyer & Rübsaamen, 2010).

Cross-functional teams act more efficiently when members with different backgrounds and functions share information and comprehend different perspectives. Integrating various ideas between functions enables to find possible solutions for the problems encountered during new product development process. Cross-functional integration can decrease inter-functional conflict and can advance decision-making that lead to better chance for product survival in the respective market. The literature indicates the linkage between cross-functional integration and commercial success of newly launched products. (Thieme, Song, & Shin, 2003).

As stated by David, Griffith & Lee (2016), competing in global markets, an MNC should act responsibly to utilize and leverage the knowledge resources which are penetrated globally. MNC enables integration of subsidiary and headquarters by running activities through intra-organizational structures by aiming collaboration for trust and dependence among the country (subsidiary) and headquarters that provides an organizational environment which supports more innovative activities to develop new products. In this perspective, subsidiary acts as a sales function in the local market and manage the customer involvement as a co-developer and information source which positively influences new product outcome with the condition of high level of cross-national collaboration.

In the literature the role of cross-functional integration on the front-end stage is significant and explained as, managing mutual understanding, setting communication framework and building relationships, improving idea and transferring technology between functions, controlling resistance, decreasing uncertainty by understanding of other functions' limitations and capabilities, providing necessary communication flow and enabling to sort out conflicts between functions (Kim & Wilemon, 2002a).

The results indicated that the the positive tendency of the answers given to the question about communication quality, referring to accurate and transparent information transfer between all functions is on a higher level but on the contratry, the speed of information flow is on a lower satisfaction level according to respondents. In addition, the satisfaction level of status updates and the explanation of stopped business case reasons are found low. All findings support the literature in terms of existency for cross-functional collaboration within the research context nevertheless also indicates the need for having higher level of collaboration.

There were a range of comments made by the respondents which also supports the literature for cross-functional activity need in new product development process in terms of communication framework as stated by Kim & Wilemon, (2002a) and summarized as;

**It's improving but depends on people involved, if regional team has good contact with headquarters, then this supports the higher quality communication and info flow.*
**Time to time, headquarters has to be pushed to get more updates and it seems that headquarters is perceived not always open about how strongly they intend to support a project (priority level).*
**And also, sometimes the reasons why some business cases are canceled is unclear, it should be transparent and understandable. Normally the initiator of a business case must be informed about the status and if rejected, the reasons must be communicated in order to sharpen the future new product pipeline process.*
**The tool in our system is good to process the new product pipeline management and also, there is a certain level of mail traffic for initial communication and information gathering.*
**The speed of information flow; can be better, getting improved, depends on people and priorities / time, if the business case is convincing, it usually works out!, in some cases, it is extremely slow and in some cases, it is very fast – may be it should*

be standardized, we need a faster process - more agile - less time to market workflow.
**The status updates; it really depends on the project owner but we need to improve, I also have my difficulties in posting frequent updates as there are just so many tools and charts to update on a regular manner, The system tells "changes or update on activities or information" whenever the involved people in the biz case write, and that is very helpful to know what's going on, needs more intensive use to generate track record, many time gaps are visible, some teams do a good job of updating while other teams hardly ever update unless asked, notification is good by the system but poor format, update frequency is not enough, it is not really used as communication platform, it is more a status documentation.*
**Local marketing and product management can play the role to keep efficient communication on the updates.*

The reasons of stopped business case, the findings indicate that 63% of respondents are not satisfied on transparency and timing for information flow within the involved groups about stopped business cases.

6.1.1.6. Systems for NPD Processes Execution

In order to run successful NPD processes, organizations need to install systems to enable teams which globally dispersed run effectively. Multistage stage-gate platform which provides infrastructure from idea to launch instead of ad hoc solutions (Cooper, 2013), virtual teams and collaborative tools (video and audio conferencing, e-mail, instant messaging, on-line meeting) provide necessary communication platforms for team members of respective projects who are located geographically in different places and allow to access company's data and conduct certain tasks on real time to run the NPD process effectively (Cooper, 2019), from the people perspective as it can impact a project through effective transferring of front-end learning to the development teams, knowledge of the screening

procedures used on the front-end activities are key for reaching out effective performance (Kim & Wilemon, 2002a).
In the literature, the system for NPD process execution are referred how it is organized, structured, utilized and informed to functions in the respective organization.

In the research context, I found out that necessary infrastructure exists and support the literature as one of major organization level success factors. Also, there is certain employee awareness about new product pipeline management in global organizational set up. The results revealed that top management that has close network with GHQ, R&D and respective business unit where all mainly located in the headquarters perceive higher employee awareness and knowledge of countries in terms of new product pipeline activities on the contrary to regions, countries, sales and marketing functions.

There were a range of comments made by the respondents regarding the knowledge level of countries in terms of new business case creation;

**General Process is known, but no details, additionally also, no knowledge about the different steps and gates, many times, basic information are missing.*
**Often too complicated process, not easy to proceed, especially the approval work flow is not so well known.*
**Training is needed.*
**Need to be Daily topic of sales team.*
**Strongly depends on country and market, due to different market sizes and potentials of the countries, creation ratio of the business cases is different, therefore I don't believe that the knowledge will be at the same level.*
** I think they technically know how to do it but the quality of business cases in terms of innovative solutions could be better.*
**Probably only colleagues that were involved in business cases are aware about the new product pipeline management.*

**The NPP is widely communicated through the company structures but there is no follow-up for checking the understanding.*

I conclude that there is a certain knowledge gap between headquarters and the field which needs to be examined.

6.1.2. Business Case Level Variables

Business case level success factors refer to the company's individual front-end projects which should be considered by respective project leaders and teams.

6.1.2.1. Project Ownership

One of the key steps on front-end management starts to assign a person (or a team) to gain success (Kim & Wilemon, 2002b) who has proficient knowledge and experience in respective markets, technology, necessary resources, company capabilities, possible limits and capability to comprehend the nature and sources of uncertainty. Project leaders assume certain roles through the NPD process and especially on the front-end stage, they define targets, set and develop plans, lead team and prioritize tasks, as it is indicated in the literature, project leaders have direct influence on performance outcomes (Kim & Wilemon, 2002a).

As Cooper stated (2019), a clearly identified project leader is in charge and responsible for driving the project. The project leader is responsible for the project from idea to launch, running the project right through the process including all stages and the organizations who are weak in this area shows low business performance.

In a micro perspective, a project leader of a NPD project is referred to as project owner while on a macro view as given in the research context, an organizational function might also assume the project ownership responsibility as a coordinator in

MNC such as regional headquarters to facilitate all business case stages between MNC headquarter and the countries (subsidiaries).

The findings are in alignment with literature as the results revealed that the importance of the project ownership (region) in NPD process in the research context, is significantly high in all responses of the respective functions.

**Single point ownership is a critical success factor!!*
**The Regional Market Management Project Ownership is the critical factor for success of a new product development.*
**It is of utmost importance to define clear ownership of the various steps in the NPD process.*
**Everybody is very busy, so someone has to push the case and Keep it alive.*
**It depends on which RMM (regional market manager) has the new product pipeline, some of them are quite aggressive and following really well but other can be too soft.*
** Key for success.*
**Needed for regional consolidation, coordination and management.*
**Important link between sales function and headquarters / R&D.*
**The role is crucial: the quality of proposals and arguments should be ENSURED by regional marketing team and its expertize.*
**RHQ marketing team has to cooperate very closely with GHQ team in idea consideration and evaluation.*
**RHQ marketing team has the best connection to both sides of new product pipeline idea (author and realization team).*

6.1.2.2. Reward and Recognition

Encouraging teamwork as well as individual performance through rewarding in new product development stages is considered as one of positive success contributor in the extant literature.

As stated by Cooper (2019), positive climate and culture for innovation is one of the top success factors that identifies top-performing businesses in new product development, with a significant impact on performance results and reward or recognition (but not punishing failures) for idea generators, new product successes are one of the attributes of positive climate and culture. Headquarters set rewards to motivate and promote internal competition (Liu, 2017).

Khurana and Rosenthal (1997) indicated that the management appreciation to front-end participants for business case level activities is one of the drivers for a well-engineered front-end process.

According to Kim & Wilemon (2002a), organization should encourage and reward project members for their contributions in order to maintain long-term front-end performance level. The company culture that supports the rewarding and recognition activities for front-end performance motivates project teams and has direct impact on individual behavior.

The literature highlights the positive impact of reward and recognition on front-end performance. The findings revealed that the positive tendency of the answers given to reward and recognition activities for NPP is obtained the most negative evaluation according to all participants, locations and functions. In addition, the respondents' comments indicated that the existing reward and recognition structure in the research context is not satisfactory. The respondents indicated that;

**This is an area that could be improved and should be celebrated and communicated more for successes via company global IT platform. (recognition is missing).*
**I have never heard of any reward or recognition activity for new product pipeline projects.*
**At this moment there is no reward System in place for NPP activities and Projects.*

**We have a regional award for best business case, but I see good value in rewarding from a global perspective. Some regions apply, some not, so not a globally standard process.*
**Recognition is there, but financial reward is small.*
**That is something which has to be improved.*
**Reward and Recognition do not result in worthy NPP ideas, it needs to be part of company culture and part of everyday work.*
**Reward is a risk, because it has the risk of generating unqualified NPP ideas.*
** I´d like to highlight my believing that the cash rewarding has potentially strongest effect which can boost the quality of proposed ideas dramatically.*
**Rewarding is the weakest point in NPP tooll at all. Basically, even the names of successfull NPP ideas aren´t published, and the successful ideas have no special publicity.*

So the findings align with the literature that given research context has rewarding activities but more on a individual regional basis approach instead a globally standardized structure. By taking the quotes in to consideration the respective management of the research context might review the current structure.

6.1.2.3. Cross-Functional Executive Review Committee

The formation of cross-functional executive review committee is one of the product success factors on front-end stage (Khurana & Rosenthal, 1997).

Previous research indicates that cross-functional approach is a significant influence on both the executive and department level and functional level. Cross-functional executive review committee for the front-end provides different competencies and perspectives. Khurana & Rosenthal (1997) identifies executive review committee as a group of senior functional managers who are in charge for making the go/no-go decision. They found that the presence of a cross-functional executive review committee is a factor on product success on front-end stage and they emphasized

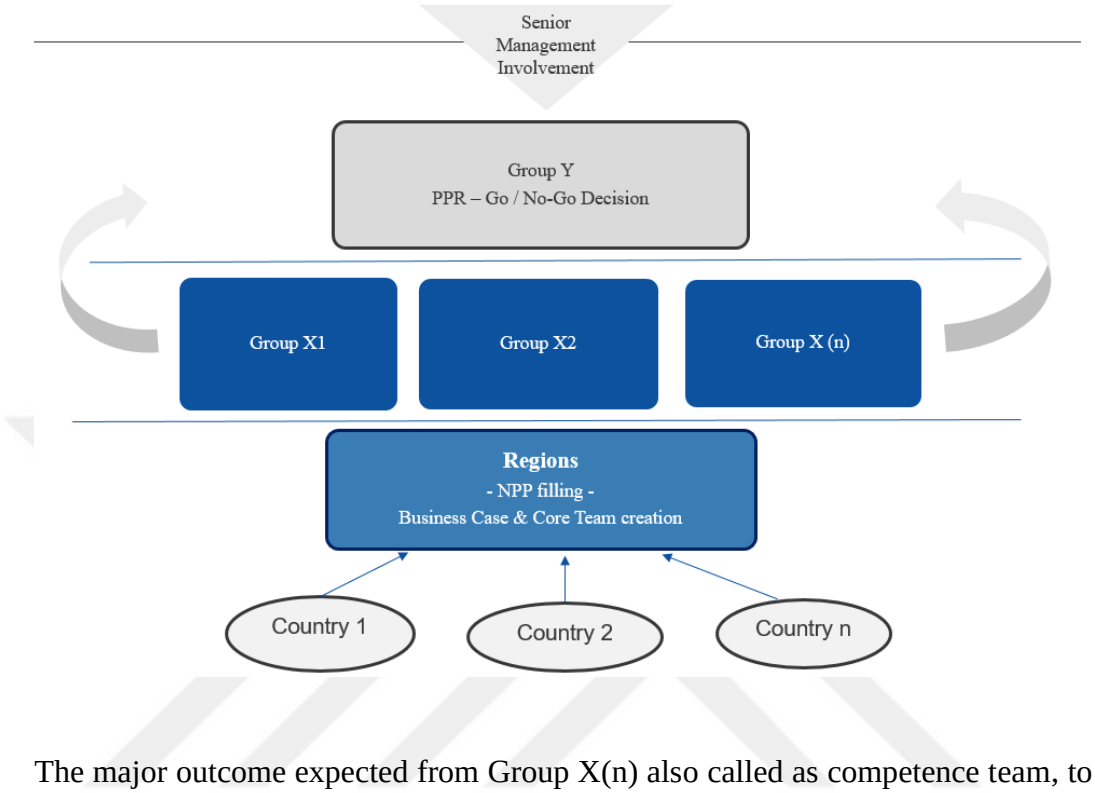
that the roles and decision responsibilities of the committee members should be properly defined and also, reviewing criteria should be clear and well structured. They also stated that the ongoing communication between the committee and the development team is substantial.

An executive review committee is a crucial screening function on the front-end stage to make sure that screening is not blinded by path-dependent learning efforts of the team. The committee should be consisted of individuals who can transparently discuss ideas and concepts, the open climate favoring risk taking, trust, and interaction in a positive manner influences front-end activities (Florén, H. & Frishammar, J., 2012).

The findings on cross-functional executive review committee in the research context indicated that there is quite systematic approach implemented and aligns the literature. The findings are based and confirmed on one and one interview with the head of global respective business unit who coordinates the global scale business case approval processes within the research context.

As shown in Figure 6.1, the first line groups (Group X) are responsible for sales and profit growth according to respective business unit strategy, product assortment and portfolio optimization and development, project prioritization and related resource allocation and identification of new business opportunities. Each Group X(n) represents a sub-group of the respective business unit. Its cross-functional set up ensures that maximum know how is covered, when taking decisions and actions.

Figure 6.1 Business Case approval process of Xzenon Company



The major outcome expected from Group X(n) also called as competence team, to create a working product at the end of the NPD process and keep generating new product pipeline portfolio (business cases), which covers short, mid and long-term aspects and finally, to provide a solid sales turnover, margin and market share according to each Group X strategy. The Group X(n) consists of cross-functional and cross-national team members and gathers on a monthly basis to review the respective business cases and decide on which ones to be proposed to (Group Y) the executive review committee. Group Y represents higher level of decision authority gathered from cross-functional and cross-national members which meets three times a year to select business cases that will be stopped, keep in identification, move to qualification, development or deployment stages called as project portfolio review (PPR). All business cases' progress, business risks and opportunities, as well as ongoing portfolio optimization activities are regularly reviewed at the PPR meeting. In this decision level, there is continuous information flow between Group Y and senior management regarding to highly strategic project prioritization and budget approval for specific business cases.

All the process starts from bottom up by uploading a new business case by regions (cluster of subsidiaries) in NPP online tool and moves according to structured approval processes between front-end and deployment which is a significant indicator for business case level success factor in alignment with literature.

6.2 DISCUSSION ON BUSINESS CASES

A project team for selected business case and an executive review committee of senior functional managers are responsible for making the decision about *project status* which refers to go (active) / no-go (stop) (Khurana & Rosenthal, 1997) that I have identified as unit of analysis and dependent variables of this study. I evaluated the dependent variables with defined independent both qualitative and quantitative variables as follow;

I found out that the *stage gate status* (identification and qualification) has no association with project status.

The results revealed that on the contrary to the findings in the survey and literature the *project ownership* independent variable both for region and country do not have an impact on project status active or stop.

The findings (Fisher exact test $p<0.001$) highlighted first, significant association between *module* and project status, second, significant association (Fisher exact test $p=0.001$) between *application* and project status.

The results highlighted that *development effort* has no association with project status.

The results (Fisher exact test $p=0.006$) revealed a significant association between *development time* and project status which Fisher's exact test with pairwise comparison indicated that the business cases developed in long term are less likely

to stay in project status “stop” than the projects developed in medium (p=0.011) or short terms (p=0.029).

The development time variable is highly mentioned in the extant literature (e.g., Gupta & Wilemon 1990; Khurana & Rosenthal 1997; Kim & Wilemon 2002a; Cooper, 2019) from variety of dimensions for NPD process and in general discussed of reducing on the contrary of the findings which highlights business cases that have long development time likely to stay in active project status compared to medium or short development ones.

The results revealed that the number of business case *status updates in* identification stage are significantly higher in projects status “stop” than in “active” (Median(IQR)=2(3) versus Median(IQR)=0(1), p<0.001).

The reduction of uncertainty is critical to success on the front-end and it is crucial that managers develop a work set up which allows processing of information and allows the company to act on that information. Organizational methods and tools, such as planning, special reports, and formal information systems can feed development to participants with necessary information and according to literature, such methods and tools are efficient in reducing uncertainty. The findings highlighted that the existing organizational set up (NPP management tool) in the research context confirms the impact on front-end activities by providing an information platform for the participants to closely monitor the project progress-status updates (Florén et-al. 2017).

The findings indicated that *total potential value* of the business case is significantly higher in projects status “active” than stopped (Median(IQR)=T€2.000(T€4.000) versus Median(IQR)=T€ 500(T€ 900), p<0.001) and also same significance apply for both identification and qualification sub front-end stages.

In the extant literature, future business potential is discussed and it is indicated that front-end activities are associated with strategic opportunity when selecting business cases and future business potential is one of the key measures of strategic opportunity before business case selection (Martinsuo & Poskela, 2011). As stated by Florén et al. (2017), an idea is "stopped" if decision makers decide the proposed product has low or no commercial potential. The findings confirm that the business cases with high potential value stay in "active" status which is in line with the literature.

A statistical model is constructed based on the studied independent variables and applied statistical analysis (univariate, multivariate regression and decision tree algorithm). Business case status update, development time, total potential value of the business case and application-new independent variables are found as an input to calculate the probability of business cases to stay in "active". Selected model revealed that both total potential value of the business case (€) and application-new independent variables are found as major key factors.

I identified six countries as a cluster (Cluster 2) which has significantly higher number and value of active projects, in similarity, based on independent variables derived from the best model (Table 5.22). The analysis also revealed that the tendency of the answers given to survey questions on project ownership (Q10), communication quality referring to cross-functional team collaboration (Q11), customer commitment (Q13-Q14), total potential value of the business case (Q13) and high chance for success (Q14) are found similar. In addition, the Cluster 2 countries provided "No" answers (with 65% frequency) to information flow for the reasons of stopped business cases indicated common similarity on the satisfaction level of cross-functional team collaboration (Q16). The results also highlighted that three countries in the cluster have R&D, production facility and acting as regional headquarters which holds 62% of the total active business case potential value (€). Another finding indicated that 65% of the total active business case potential value (€) is generated by a single field (module-new) as a market segment in the

respective business unit. In addition, three countries hold 76% of the active business case potential value (€) of this single field (module-new). Finally, I conclude that respective countries have a significant market size in terms of the indicated technical field (modul-new) which confirms the literature "*the nature of the market is an essential component, failure to adopt a strong market orientation in product innovation are the factors for new product success"* (Cooper, 2019).

IMPLICATIONS

This study aimed to explore the impact of subsidiaries of a multinational corporation during new product development activities only focusing on front-end stage by using reverse knowledge transfer capabilities covered under resource-based view approach.

The findings of this study provided implications for theoretical framework, as well as practice.

7.1 THEORETICAL IMPLCATIONS

This study supported the literature in two perspectives in the context of multinational corporation and subsidiary relation.

First, *subsidiary as a sales function*, based on Ernst, Hoyer & Rübsaamen (2010) study, the importance of sales function integration to R&D and marketing functions in new product development process significantly revealed a new academic research area and since then especially, the rise of multinational companies through globalization provided a research field cross-functional and in the same time cross-national in the literature. According to literature, sales function plays a crucial role particularly bringing the "voice of customer" into the company, also, a substantial impact on front-end stage (such as generating and assessing ideas, deciding the critical product features, creating business cases) which subsidiaries of a multinational company act as local sales functions that contributes a lot to NPD activities. In this study, I intended to support the literature focusing on business cases derived from different subsidiaries (local sales functions) of a global organization by analyzing only on front-end stage.

Second, *front-end innovation*, during literature review, I found out that the front-end literature is relatively new, and the gaps in the literature on front-end

success in NPD, needs to be addressed more specifically. The front-end success depends on organization and business case level factors (Koen, Bertels & Kleinschmidth, 2014) which are crucial to develop more effective ways to lead front-end process.

I discussed and confirmed the literature for the selected factors (organizational and business case level) which impact on front-end stage according to the survey results.

I built a statistical model to find the probability of a business case staying in active status during new product development based on studied independent variables in different sub-stages of front-end.

The statistical analysis on the secondary data revealed that two independent factors from the constructed model (total potential value of a business case and technical field as a market segment) came into prominence for success on the front-end stage which also supports the literature (Florén et al. 2017; Cooper, 2019).

I also extended the literature by conducting clustering analysis which revealed that subsidiaries that have similarities (Cluster 2) in terms of independent variables found in the constructed best model, indicated higher number and value of active projects on front-end stage.

7.2 PRACTICAL IMPLICATIONS

This study can draw implications for practices in several ways.

First, managers should set formal communication platforms within the organizational network and provide sufficient, clear knowledge transfer with a regular flow about innovation strategy in order to support new product development success.

Second, managers need to pay close attention to especially front-end stage and its sub-stages for new product development success, providing necessary time to the project teams as a resource.

Third, besides transparent and accurate communication style for successful cross-functional integration, manager should also consider communication speed in the organization when managing front-end activities.

Fourth, necessary training programs have to be created and implemented to develop people who become member of project teams to perform successfully from idea to market.

Fifth, to evaluate the success of the project teams, reward and recognition activities should be carefully designed by the managers according to the company culture by considering the quality of the business cases and not the quantity.

Sixth, on the front-end, the move of the respective business cases between sub stages, there are certain independent variables derived from this study and become significant in a constructed statistical model which managers can consider to measure the probability of their NPD projects in terms of staying in active status. Shortly, this model can be used as one of the supportive management tools on the

front-end for respective business case evaluation and provide insights to take necessary steps for the business cases accordingly.

Finally, managers should set necessary procedures in terms of cross-functional communication as the findings indicate that 63% of respondents are not satisfied on transparency and timing for information flow about “stopped business cases”.

CONCLUSION

8.1 LIMITATIONS

In this study**,** I explored the ways and the challenges of managing success factors in new product development process by just focusing on the front-end stage.

I did not consider product effectiveness/performance (Brown & Eisenhardt, 1995), profits, revenues or market share as widely studied in the extant literature but I only studied organization and business case level factors in a selected research context which are highlighted in the literature. Additionally, this study contributes to extant literature by mainly investigating the contribution of sales function (subsidiaries) to NPD performance.

Despite contributions to extant literature this study has some limitations.

With regards to the responses, this is a single case study, one specific multinational company operating both in industrial and consumer markets, in addition, only one specific business unit within in the selected company considered as a research context which limits the observations and findings so the transferability of the empirical findings to other organizations is also limited.

Another limitation is, the secondary data set used for data analysis in this study considered only for a three year-period which limits the observations. The findings could reflect different results if the observations are carried out for a longer period.

8.2 FURTHER RESEARCH

As this is a single case study, the extension of research context to different industries and more companies will allow researchers to analyze a broader view for the research area and consequently, the results might change the findings.

This study considers three years observation period and explore the data accordingly. I propose to extend the time dimension and number of business cases analyzed in order to build the model on larger scale data in order to increase the validity and generalizability.

It would be an important contribution to investigate on decision-making dynamics in groups which consist of different nationalities and functions in order to reveal the impact of cultural, business political and individual level sub-factors (trust, open communication) in joint decision-making process to move business cases to a different stage in new product development, specifically, on the front-end stage.

Additionally, this further research might reveal how the tacit knowledge (employee skills and experiences so called know-how) is leveraged especially for the front-end activities within the group members which I think might support RBV approach in the literature.

In this study, results indicated a mixed outcome for reward and recognition in terms of positive contribution as stated in the extant literature (Kim & Wilemon, 2002a) for new product development projects and emphasized as organization should encourage and reward project members for their contributions in order to maintain long-term front-end performance level. The future research can focus on fuzziness of the findings which presents not everyone in the organization in favor of reward and recognition as it is believed that it increases the quantity (number of business cases created within the research context) but not the quality (the accuracy and the

amount of data as an input for decision-making) of business cases created so further studies might focus on negative impact of reward and recognition as a failure factor.

Furthermore, future research can also focus on why some subsidiaries surpass others within a multinational organizational network in terms of running significantly higher number and value of “active” projects on the front-end stage in three dimensions, first, local execution capability of GHQ innovation strategy, second, local cultural diversity and third, local market dynamics.

Project ownership success factor is also found as significant according to survey results within research context on the contrary of business case data set. A further research specifically focusing on project ownership variable (strongly emphasized in the extant literature as a prominent factor in new product development) may provide other perspectives for a business case to stay in active or stop status.

Finally, it would be an important contribution to investigate and compare the organization and business case level factors studied in this study for *radical* product development on the front-end stage, finding similarities or discovering new factors which will definitely enhance both theoretical and practical implications.

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APPENDIX 1: Survey Questions

PhD Academic Survey

New Product Pipeline (NPP)

Dear Colleague,

I would like to ask for your support by joining for a short survey (16 questions & 10 minutes) which will be used for PhD Academic research purpose on Innovation - New Product Pipeline (NPP) process by only focusing on "identification" and "qualification" stages.

All answers will be treated strictly confidential and anonymously.

Thank you & Best Regards

* 1. Please choose your functional working area...

- ☐ BU X
- ☐ Region
- ☐ Country

* 2. How do you evaluate the awareness level of employees on New Product Pipeline (NPP) activities ?

Poor	Below Average	Average	Above Average	Excellent	Unable to rate
○	○	○	○	○	○

* 3. How do you evaluate the overall knowledge level of **Countries** in terms of New Business Case creation in New Product Pipeline (NPP) processes?

Poor	Below Average	Average	Above Average	Excellent	Unable to rate
○	○	○	○	○	○

Please specify if you have any comment additional on your evaluation above

* 4. How do you evaluate the active involvement of **customers** only in the **Identification** (idea generation) stage during New Product Pipeline process?

Poor	Below Average	Average	Above Average	Excellent	Unable to rate
○	○	○	○	○	○

Please specify if you have any comment additional on your evaluation above

* 5. How do you evaluate the active involvement of **customers** only in the **Qualification** (testing, sampling) stage during New Product Pipeline (NPP) process?

Poor	Below Average	Average	Above Average	Excellent	Unable to rate
○	○	○	○	○	○

Please specify if you have any comment additional on your evaluation above

* 6. Overall, how satisfied are you with managerial support in terms of providing necessary **time allocation** to employees involved in New Product Pipeline (NPP) process?

Poor	Below Average	Average	Above Average	Excellent	Unable to rate
○	○	○	○	○	○

Please specify if you have any comment additional on your evaluation above

* 7. Overall, how satisfied are you with global managerial **guidance** in terms of providing **innovation strategy** (existence of defined product innovation and technology strategy and the link to corporate business strategy) to all employees within global organization?

Poor	Below Average	Average	Above Average	Excellent	Unable to rate
○	○	○	○	○	○

Please specify if you have any comment additional on your evaluation above

* 8. How do you evaluate the direct involvement and support of local management (Country) to the New Product Pipeline (NPP) process?

Poor	Below Average	Average	Above Average	Excellent	Unable to rate
○	○	○	○	○	○

Please specify if you have any comment additional on your evaluation above

* 9. How do you evaluate **reward & recognition** activities for New Product Pipeline (NPP) projects?

Poor	Below Average	Average	Above Average	Excellent	Unable to rate
○	○	○	○	○	○

Please specify if you have any comment additional on your evaluation above

* 10. How do you evaluate the importance of "**Project Ownership**" (referring to Regional Market Management) role during New Product Pipeline (NPP) process?

Unimportant	Somewhat Important	Important	Very Important	Extremely Important	Unable to rate
○	○	○	○	○	○

Please specify if you have any comment additional on your evaluation above

* 11. Overall, how satisfied are you with the communication quality considering **accurate & transparent information** transfer between all involved parties for active business cases in **Identification** stage?

Extremely Dissatisfied	Dissatisfied	Neutral	Satisfied	Extremely Satisfied	Unable to rate
○	○	○	○	○	○

Please specify if you have any comment additional on your evaluation above

* 12. Overall, how satisfied are you with the quality of communication in terms of **speed of information** flow between all involved parties for active business cases in **Identification** stage?

Extremely Dissatisfied	Dissatisfied	Neutral	Satisfied	Extremely Satisfied	Unable to rate
○	○	○	○	○	○

Please specify if you have any comment additional on your evaluation above

* 13. Please rate the importance level of the factors given below in terms of their impact on "**Go or No-Go**" decision from **Identification to Qualification** stage for a Business Case? (5) the most important and (1) the least important (one evaluation for each source)

- [ ] Customer commitment
- [ ] Total Potential Value
- [ ] Development Effort
- [ ] Development Time
- [ ] Target ICP

* 14. Please rate the importance level of the factors given below in terms of their Impact on "**Go or No-Go**" decision from **Qualification to Development** stage for a Business Case? ? (5) the most important and (1) the least important (one evaluation for each source)

- [ ] Strategic Fit
- [ ] ROI/NPV
- [ ] Customer Commitment
- [ ] High chance for success
- [ ] Country/Region/BU specific

* 15. Are you satisfied with the "status updates" in the New Product Pipeline management system for active business cases?

Extremely Dissatisfied	Dissatisfied	Neutral	Satisfied	Extremely Satisfied	Unable to rate
○	○	○	○	○	○

Please specify if you have any comment additional on your evaluation above

* 16. Do you think the **reasons** of "stopped" business cases are informed to all involved parties as transparent and at the right time?

○ Yes

○ No

17. Please share any other comments you have below:

APPENDIX 2: ETHICS BOARD APPROVAL

Ethics Board Approval is available in the printed version of this dissertation.