St. Petersburg State University
Graduate School of Management
Master in International Management Program

BUILDING CUSTOMER-CENTERED COMMUNICATION FRAMEWORK FOR HI-TECH COMPANIES DURING MARKET ENTRY PHASE.

Master's Thesis
Concentration: Master in International Management

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ЗАЯВЛЕНИЕ О САМОСТОЯТЕЛЬНОМ ХАРАКТЕРЕ ВЫПОЛНЕНИЯ ВЫПУСКНОЙ КВАЛИФИКАЦИОННОЙ РАБОТЫ

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Корнилова (Student's signature)

24.05.2016 (Date)

АННОТАЦИЯ

Автор	Коршунова Анастасия Дмитриевна
Название магистерской диссертации	Построение клиенто-ориентированной системы коммуникации для высокотехнологических компаний во время выхода на рынок
Факультет	Высшая школа менеджмента
Направление подготовки	Менеджмент
Год	2016
Научный руководитель	Яблонский Сергей Александрович
Описание цели, задач и основных результатов	Важность правильно построенной коммуникации с потенциальными клиентами в сфере высоких технологий трудно переоценить. Зачастую компании в данной сфере фокусируются исключительно на технологическом качестве предлагаемого продукта, забывая о собственно потенциальном потребителе и трансляции технических преимуществ продукта в проеимущества, весомые для нужд потребителя. Цель магистерской диссертации состоит в разработке системы коммуникации для высокотехнологических компаний во время выхода на рынок. Были сследованы существующие практики коммуникации и выхода на рынок для высокотехнологических компаний. Далее было проведено исследование нужд потенциальных потребителей и готовности продукта к выходу на рынок по шкалам технологической и рыночной готовности, на основе чего была разработана система коммуникации для высокотехнологических компаний, тесно связанная с потенциалом продукта на рынке и потенциальными рыночными рисками. Результаты показали, что наиболее важными аспектами успеха коммуникации является степень готовности продукта к выходу на рынок, знание каналов коммуникации, предложенных самими потенциальными клиентами, и международная сеть дистрибьюторских соглашений.
Ключевые слова	Рыночная и технологическая готовность продукта, система

	коммуникаций для высокотехнологических компаний, выход на рынок высокотехнологических компаний.

ABSTRACT

Master Student's Name	Anastasiia Korshunova
Master Thesis Title	Building customer-centered communication framework for hi-tech companies during market entry phase
Faculty	Graduate School of Management
Main field of study	Management
Year	2016
Academic Advisor's Name	Sergey A. Yablonsky
Description of the goal, tasks and main results	The importance of the properly structured communication with prodpective customers in the hi-tech domain is hard to underestimate. Often the companies fall under the technology push bias, forgetting about essential customer orientation and the necessity to communicate the technical characteristics of the product into the customer benefits. The aim of this Master thesis is to develop the communication framework for the hi-tech companies during the market entry. The existing communication practices and market entry strategies for hi-tech companies were investigated. Next the investigation of the needs of the prospective customers was performed and the market and technology readiness levels of the product were determined and based on that the communication framework was developed, which is helping the companies to mitigate the market risks. The results hae shown that the most important communication aspects in this domain are the market readiness level, the customer offered communication channels and wide downstream agreements network.
Keywords	Market and Technology readiness levels, communication framework for hi-tech companies, market entry for hi-tech companies.

Contents

INTRODUCTION

The innovation and the hi-tech products are the cornerstone of the modern economy, driving all its sectors. Nowadays a lot of opportunities for such hi-tech startups and enterprises exist to develop, gain investment, internationalize and partner for business opportunities or technology transfer. However, the essential for any company survival is the customer focus and market orientation, which is often skipped in the R&D enterprises due to various reasons: be it the restriction in the capabilities to market the product with extensive technology knowledge, or anything else. Such misconception results in high failure rate of such products introduced to the market. To avoid that, the focus on customer needs is essential as the first vital part of the marketing hi-tech products, and the focus on the actual communication to and with the customer to actually transfer the benefits the hi-tech product may have for the customer.

The aim of the current research is to propose a customer-centered communication framework specifically for the hi-tech companies, supporting their decision-making and action during the market entry.

Such aim is supported by the following actions: 1. Choose the appropriate methodology underlying the framework building; 2. Determine the sample and interviewing procedures of prospective customers, categorizing them according to job-to-be-done, circumstances, objectives, adoption factors (drivers and deterrents), and general innovator profile, extraction of valuable insights about communication outreach; 3.Build the advisory communication framework based on the Marketing Testbed method and customer insights analysis, accounting for the risks of the market entry.

The research is organized as a case study, and the methodology, underlying the communication framework construction relies on the Marketing Testbed approach, developed by by Hasenauer, R., Schildorfer, W. and other fellow researchers during the activities of EU-government funded hi-tech centre, supporting hi-tech innovations in Western Europe and having helped the hi-tech enterprises to establish their test markets using the developed methods, which partially overlaps with the customer development method of Seteven Blank (2013).

The data used is gathered through the semi-structured interviews with the company representatives and their prospective customers from various industries to gather the information for the technology and market readiness level of the offering for the market where the company was planning the entry.

The study is organized in 4 chapters, each chapter supporting the consequtive development of the communication framework. The first chapter, state-of-the-art of hi-tech product communication to the market research explores the theoretical background for the framework, the hi-tech product definition and the hi-tech markets environment, along with the

hi-tech marketing and communication instruments, hi-tech enterprises modes and strategies to entry, as relevant for the communication framework. The second chapter, methodology and theoretical study of the product communication for hi-tech markets during market entry hase discusses the actual methodology used, Marketing Testbed, and its alternatives, along with the data collection and analysis procedures. The third chapter, the empirical study of customer-centered communication for hi-tech companies during market entry presents the results of the interviews, the customers insights regarding their needs related to the investigated company's product, all later structured as an advisory communication framework

The main theoretical development, proposed in the study, involves the development of the marketing testbed method for the hi-tech communication strategy domain, which is also implied to have a practical meaning for the hi-tech companies entering new markets.

1. STATE-OF-THE-ART of HI-TECH PRODUCT COMMUNICATION TO THE MARKET RESEARCH

Object of the study is customer-oriented communicating practices of the new products of the hi-tech companies, operating in the software industry. Several reasons underlie such object specification: first of all, even though hi-tech companies have specific traits, discussed below, allowing to separate them into a separate class, still the hi-tech companies operate in different markets of software, aeronautics, telecommunications and etc. According to North American Industry codes the software publishing industry is separated into a separate field (National Science Board, 2004) and OECD classificatory implies, that all the industries, producing hi-tech products, use information technologies and common or industry specific software (OECD, 2009).

1.1. Background

Importance of proper communication of the hi-tech companies with the market during the market entry is crucial, which is supported by numerous theories, listed below. Another issue is specificity of available communication channels and customer relationships. Therefore, an attempt to build a framework, which would be built based on the customer expectations and needs, and communicated properly to each of the customer segments, requires investigation of several fields of theory, regarding market introduction of a new hi-tech product:

1.2. Literature overview

Hi-tech product and innovation definition. To provide for the clarity in the following review of approaches to hi-tech marketing, a relationship between the hi-technology and innovation definitions should be shown. Commonly there are several ways of defining the hi-technology, a distinguishing trait of hi-tech companies. As Steenhuis & Bruijn (2006) summarize them, there are Industry-based definitions, such as by Department of Commerce in the US, classifying hi-tech and non-hi-tech industries, or Malecki (1985), associating hi-technology with innovation intensive industries, which is a common notion, assumed in multiple articles, devoted to marketing of hi-tech products (Mohr, et al., 2009). Another set of definitions is company-based, where hi-technology is described through hi-tech companies, which are either described as small R&D centers (Bullock, 1985) or companies, immersed into rapidly changing environment (Mohrman & Von Glinow, 1990; Schoonhoven & Jelinek, 1990). One of the most rapidly changing environments is that of the hi-tech software industry (Ruokonen & Saarenketo, 2009). Then there were identified product-based definition, defining hi-technology product based on the knowledge intensity of its production (Hansen & Serin, 1997), and life-cycle based

definition, defining hi-tech industry through shorter than average new product development cycles (Bacon, et al., 1994). Three more approaches can be applied as well: input-based, highlighting high portion of R'n'D expenditures in hi-tech industry, output-based, noting the generated service as output of hi-tech company activity. Such output differentiates hi-technology from low technology via levels of advancement and complexity of the technology employed in the service. And combined approaches highlight both input and output, as well as market dynamics, invisibility of competitors and need for demand articulation, etc. (Moriarty & Kosnik, 1989).

Although different, altogether these definitions lead to an integral definition of hi-tech companies, operating in rapidly changing environment, having knowledge-intensive products, developed at fast pace and based on some kind of what is considered to be innovation in the technology sphere.

That leads to the need to clarify distinction of the hi-tech products from innovation. Mohr, et al. (2009) define hi-technology as a type of innovation, whereas an innovation is a broader category, meaning anything new and value adding or problem solving (p.8). Similarly innovation definition is summarized in the work of Rogers (1998) or as Baregheh et al. (2009) put it, after performing content analysis of existent research, "Innovation is the multi-stage process whereby organizations transform ideas into new/improved products, service or processes, in order to advance, compete and differentiate themselves successfully in their marketplace." (p. 1334). That allows applying, although cautiously, the innovation marketing practices to the hi-technology marketing, the hi-technology products being very knowledge intensive and complex.

Hi-tech market characteristics. The complexity of the hi-tech products is reflected in the hi-technology markets as well. Generally the hi-tech markets possess the characteristics of market uncertainty, technological uncertainty and competitive volatility (p.11, Mohr et al., 2009).

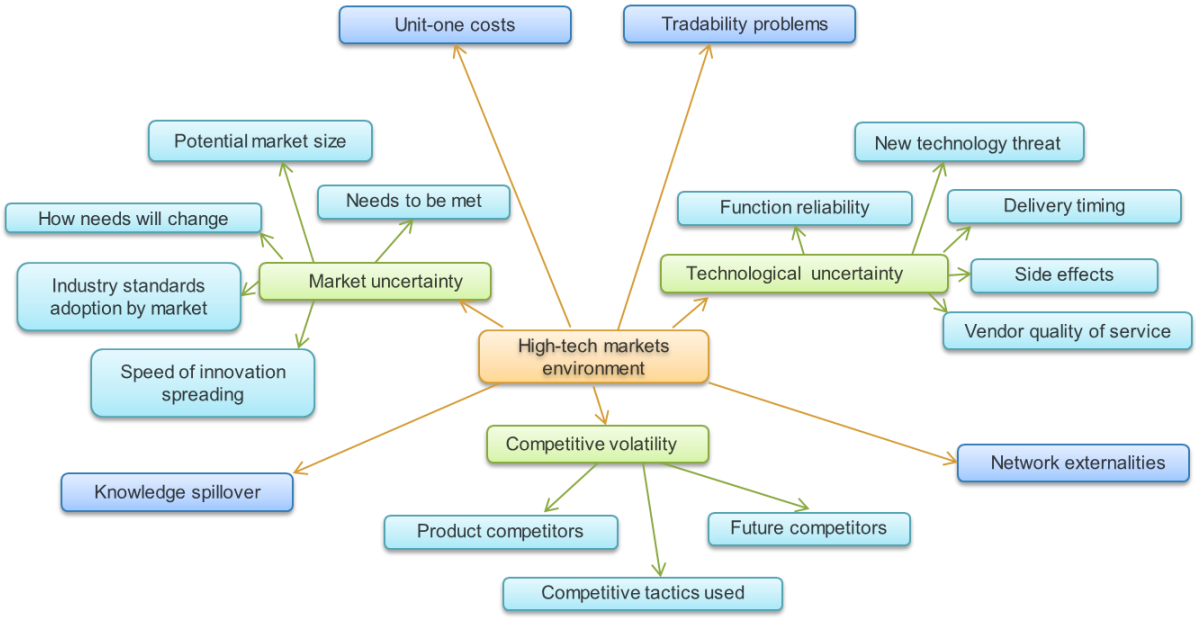


Figure 1. Hi-tech market environment (Mohr et al., 2009)

As shown in the Figure 1, factors affecting the hi-tech markets consist of sub factors. So the market uncertainty is mainly about customer adoption: which of their needs will be covered by the new hi-tech product, including whether the learning will be required to use or apply the product, will those needs change, how fast will the product be adopted, will the industry standards be adopted, and which ones will become dominant, how many prospective customers are there, which is also related to shifting the company's focus from early adopters to more mass market. The technological uncertainty is all about delivering the actual invention, reliability of its functioning, meeting the delivery schedule, being competitive to becoming obsolete due to new arising technologies, and reliability of vendor or partner actually delivering the product or service (Mohr et al., 2009). From management perspective all these factors have direct implications for market entry timing (first or second mover advantages), the customers relationships, where waiting for a preannounced product may influence them adversely (Sorescu, et al., 2007), and branding – especially in case the vendor does not deliver intended quality, or a partnering company brings up unexpected change, influencing the cooperation of the products (Moriarty & Kosnik, 1989). Competitive volatility denotes both the degree of possible change in the competitive landscape, and to the range of competitive techniques in the market. So the company cannot be sure, who its future competitors are, due to the fact that often new competitors emerge on the base of innovation in the other industry or technology domain, which is also exemplified by the convergence tendency, when several functions get united in one product, for instance, phone. Same reason justifies uncertainty about competitive techniques, possibly brought from another industry, and for the new products, competitors to the company's products, where an old need may become satisfied in a new way (Mohr et al., 2009). Here the

main marketing focus should be in avoiding the marketer's myopia, attention to potential disruptive innovations and dealing with innovator's dilemma. Marketing myopia is an established marketing concept, pointing out the necessity to define the markets broadly, based on the customer needs served, rather than on existing products, in order to exercise best readiness to potential new competitors' threats (Levitt, 1960). In modern studies it also refers to the chance of a disruptive innovation arising, which is an innovation, either on the business model side or in the extremely newness of the product side, which researchers consider to be a game changer in the industry it is introduced into (Markides, 2006). The innovators dilemma involves the decision to be made in case of disruptive innovations happening in the market, which start from its low end and gain customers, whereas the company, which has been innovative and successful so far is locked in within its value network, involving existing customer contracts and products and services already supplied to them, which led the company to current success. Leading in this case involves creation of new organizational structure catering same customer needs in a new way or new ones (Christensen, 2013).

All the theory of disruptive innovation, and generally the product competition in hi-tech industries is based on the theory of technology life cycles. Technology lifecycle is a widely used concept in innovation management, indicating various stages of the technology development from its research and development through ascent and maturity to decline (Bayus, 1998). It is generally described via macro view and the technology s-curves (Taylor, M., & Taylor, A., 2012). The macro view is centered on Anderson and Tushman (1990) model of technology evolution, which was further developed by numerous researchers (Yu and Hang, 2009; Murmann and Frenken, 2006). Such model of technology evolution, as illustrated in the Figure 2, summarized cycles of multiple individual technologies into general technology trend, which is a cycle of technology development, going through stages of discontinuity because of some disruptive invention, then through stage of fierce competition over which technology will become the dominant design, and, after the dominant industry design is selected, also changing the competitive strategies, through the stage of continuous, evolutionary innovations. Then the cycle begins again with another breakthrough invention (Taylor, M., & Taylor, A., 2012). Some implications are drawn for the customer demand for the technology depending on the stage in the technology cycle: Adner, & Levinthal (2001) show that during the early stages of the technology cycle customer preferences are less elaborate, and the product innovations, meeting minimum performance criteria, are acceptable, while with technology maturity customers become more price sensitive, and search for cost efficiency forces companies to bring process innovations.

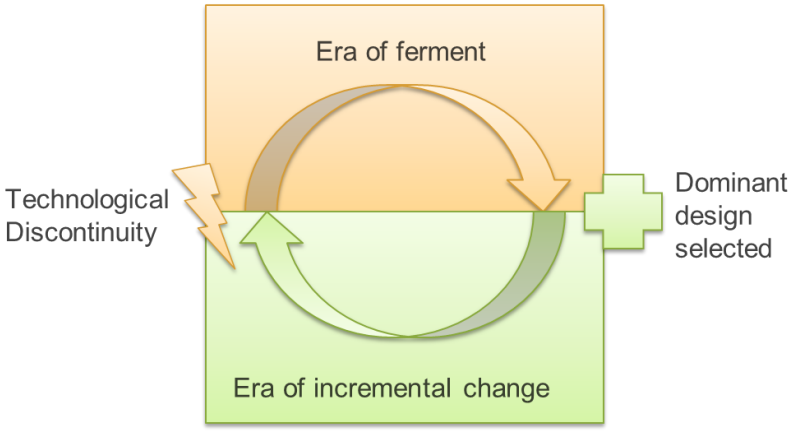


Figure 2 Macro model of technology cycles (p.60 Schilling, 2005)

Development of an individual technology is reflected in the concept of the technology s-curves (Schilling & Esmundo, 2009). S-curve depicts technology path from initial development to exhaustion of its potential, where performance of the technology is plotted against effort invested into its development, although often effort is substituted for time and the S-curve shape is transferred to the product adoption rates. The depiction of the s-curves is quite abstract, as the real technologies follow more of the step-wise function graph path, however it depict the common theoretical proposition, that a technology struggles through initial stages of its development, then after some stage its performance grows really fast and closer to the limit its performance improves more gradually. The stage of technology limit represents the stage of technology maturity, where a new disruptive technology may enter and replace it. (Taylor, M., & Taylor, A., 2012). Figure 3 also depict patterns of incumbent technology replacement by the new one (Schilling, 2005).

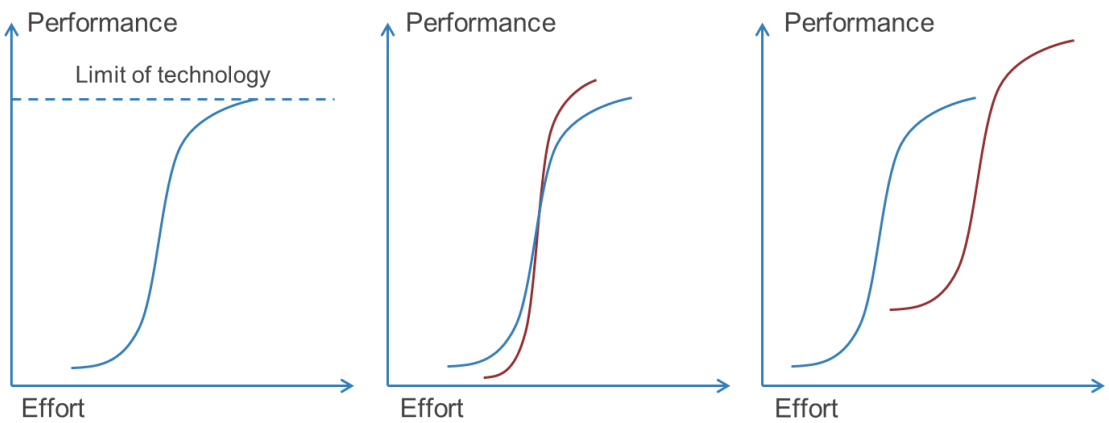


Figure 3 Technology S-curves (Schilling, 2005)

Approach, offered by Adner & Kapoor (2015) suggests to assess the technology substitution, as also depicted in the Figure 3, in the 2 left graphs, based not only on the technology performance “as-developed”, but rather “as-used”, integrating the holistic perspective

on customer experience of using one particular technology in the system of complementing products (p. 6). Such perspective highlights yet another aspect of hi-tech markets: competition is based not solely on distinct technologies performance, but on the different ecosystems of technologies, satisfying same customer needs. Such redefinition of technology s-curve application leads to a broader understanding of new technology adoption, which is seen as substitution of the incumbent technology. Practical implications are better predictability of new technology adoption, and a broader set of factors affecting the adoption, namely balance of the dynamics of new technology ecosystem emerging and of the incumbent technology ecosystem extension along with customer profiling according to the needs and adoption rates (Adler & Kapoor, 2015).

Hi-tech marketing as a separate field. Hi-tech marketing as a separate field of marketing, along with consumer goods marketing, trade marketing, business-to-business marketing, services marketing, non-profit marketing (Siems, 2012) has emerged comparatively not so long ago, first mentioned in the article of Moriarty & Kosnik (1989). Frequently the concept of 5P is applied towards marketing hi-technology products, including hi-tech product characteristics, pricing, promotion, place and people. Promotion of hi-tech products includes communication with the customers and appropriate instruments and focuses onto articulation of the product's benefits and information provision on special features rather than branding (Yadav, et al., 2006). Common categories of promotion mix within the 5P concept include advertising, personal selling, direct and interactive marketing, PR, etc., all of these means differing in their cost and audience coverage (Kotler, et al., 2016). For hi-tech companies various PR activities, aimed at global company image development, are important (Lavinia & Balasescu, 2013). Later emerged the concept of integrated marketing communications, IMC, which aims at aligning the messages sent across various communication channels along main product idea (Yesnin, 2012).

Hi-tech product launch involves such categories, as technological fear of the customers due to its complexity, which can be posited as a competitive advantage, if communicated properly (Lee & Colarelli O'Connor, 2003). Thus, focusing their research onto two parts of the hi-tech company communication strategy, namely preannouncement strategy, aiming to educate customers about the product, and the advertising strategy as major trigger for buying decisions, Lee & Colarelli O'Connor propose that degree of product innovativeness impacts the company's development, but also commercialization activities, especially in case of radical innovations, requiring potentially innovation also in distribution strategy as well, and it impacts the customer up to the level of necessary learning and adoption efforts to use the innovation. The preannouncement instrument is used to deliver the benefits of the new products to the target audience, with reassuring and instructive communicating style, coping with some portion of the

customer uncertainty, and gathering support of other market stakeholders, such as investors, distributors and suppliers, thus being important B2B marketing communication tool as well (Viardot, 2004; Schatzel & Calantone, 2006). Findings of the research (Lee & Colarelli O'Connor, 2003)show that the preannouncement strategy, aimed at customer education has better impact onto product performance if the product requires behavior change from the customers, and similar effect das the emotional appeal used in the advertisements, while goal of anticipation creation of the preannouncement and rational appeal performed better for products perceived as unique and superior to existing offers, where the customers had opportunity to take decisions based on their existing knowledge. Similarly, the underlying reason for such effect was found to be adoption difficulty of the product, related to the necessity to change behavior and strengthening the effect of emotional appeal, while product superiority just required comprehensive rational argumentation (Lee & Colarelli O'Connor, 2003).

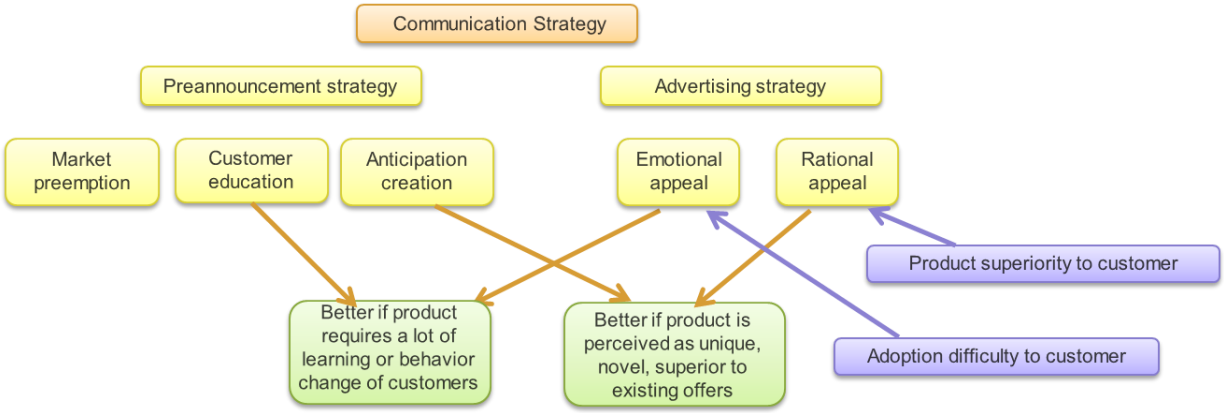


Figure 4 Communication strategy and factors impacting different tyes of customers depending on the product innovativeness (adapted from Lee & Colarelli O'Connor, 2003)

The preannouncements are usually done via various publicity instruments such as press releases, company's website, conferences and events organization, company's representatives speeches at public venues, trade shows, etc. (Su & Rao, 2010). Trade shows, seminars, and trainings, although costly, provide company with an opportunity to directly engage prospective customers into trying the new technology and get feedback, and is a proven instrument to advance sales, less costly but similar in customer learning orientation is usage of webinars (Lavinia & Balasescu, 2013). Trade shows are particularly important for hi-tech marketing in the B2B domain, due to high concentration of interested prospective customers and opportunity for meaningful personal product demonstration and opportunity to gain lead users and raise awareness of relevant stakeholders (Lilien & Grewal, 2012).

In hi-tech marketing the category of understanding becomes important, moreover as even the product category might be unknown to the customer, or his or her need in it might be

unrecognized (Gronhaug & Moller, 2005). Rising customers' understanding of hi-technology products is usually done via customer education approach (Yadav, et al., 2006). The communicability of the invention, combining the innovation with familiar to customers elements is also important, as it allows to bridge the knowledge gap between them and the innovator. (Glodenberg, et al., 2001).

Frequently the hi-tech solution provider does not understand the customer decision-making and purchasing behavior as well as criteria of value formation for their products (Munnukka & Järvi, 2011). Similarly, importance of customer value comprehension lies in subsequent proper shaping of the product message to be communicated. Factors, affecting customer perception of hi-tech product value were investigated in Munnukka & Järvi (2011), where through research of customer perception of hi-tech customer products set of factors was derived, as summarized in the Figure 4.These and similar factors, shaping customer perception of the hi-tech product or service need to be considered by the company, to be included in the technological content reinterpretation in the customer terms (Viardot, 2004).

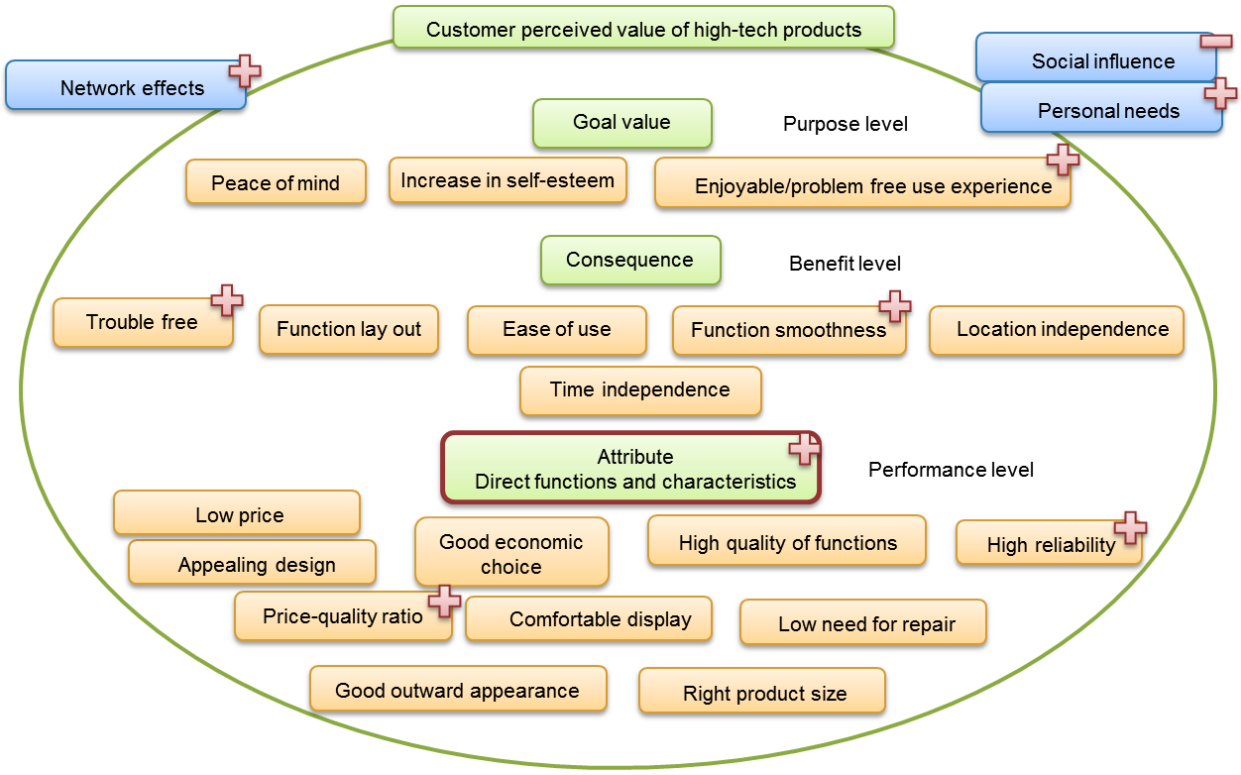


Figure 5 Factors affecting the value of hi-tech product, as perceived by customers (Munnukka & Jarvi, 2011)

Figure 5 shows the research results of the Munnukka & Järvi (2011), where the means to end approach to customer value of hi-tech products was applied on the basis of values hierarchy described by Woodruff (1997) as a more influential component of serving the products to customers compared to methods assessing customer satisfaction. So Munnukka & Järvi (2011)

found, that most notable factors, positively influencing value of the hi-tech product as viewed by the customer are network effects, so presence of people in a person's on network, using the product; user-friendly usage experience and absence of troubles, but mostly the hi-tech product value is enhanced by direct attributes of the product, such as price-quality ratio and high functional reliability, whereas opinions of other people had negative impact on perceived economic value of the product.

Hi-tech products market entry. Important is to distinguish between technology life-cycle and the product life-cycle, although the technology itself is often equated with the product, as one of its specific forms (such as in Heffner & Sharif, 2008; or Kaplan & Tripsas 2008). Contrary to popular notion, that product cycles are instantly shortening, research in the desktop computer industry shows that product cycles are shorter for new product, based on the existing technologies, while new ones are already becoming available, while the product cycles of new technologies have not shortened as much; another finding is the fact that in the hi-technology markets new technologies exist simultaneously and compete with older technologies (Bayus, 1998)

Technology trajectories. Speaking of the company entering the market it is necessary to give a glance towards strategic decisions of companies entering the market which are based on the customer segmentation. First the technology trajectories appeared in the article of the Dosi G. (1982), in response to the notion, that innovation is mostly driven by the market forces, highlighting the need for noticing joint influence onto the innovation strategy of such factors as scientific advances, market expectations and institutions. Technology trajectories were described as particular predefined paths for the innovation development within the existent and present technology paradigm, which involves set of questions and approaches to technological and scientific problems. Technology paradigm shift is reflected in technology lifecycles theory, mentioned above (Yoo, 2009).

Technology trajectories impact onto market strategy of the company was highlighted already in 1999 by the Intel Corporation CEO A.S. Grove, when the previously existing waterfall model has to be adjusted for previously unnoticed so-called segment zero, representing low-end market (Grove, 1999). Reason for that was the fact that low end market, when ignored by major players potentially was breeding powerful competitors, who would start from low-end and then would push towards higher tiers of the market. Thus, having underserved segment zero market, presence where demanded lower prices and therefore also target costing, and technology trajectories, advancing faster, than do customer requirements or readiness to pay, reflected in the general notion that technology is one of the economy's drivers (Farmer & Lafond, 2016). Technology, advancing faster, than do requirements of the low-end market, mass market and

high-end market, inevitably starts at one of the markets and ends in higher tier, so the more advanced technology to cover the development costs has to start higher and then push towards most innovative and ready to pay for the innovations users, whereas low-end technology starts lower, but in the case of advanced technology not advancing its market base, still may overcome the incumbent. Noticing such trends in technology development, Christensen (1997) offered certain competitive strategies for innovative technologies: 1) move along the technology trajectory and market the product to higher tier customers; 2) move along market demand and customer needs; 3) transform the market demand, fostering the needs and requirements to advance faster. Such shifts in strategy due to inherent product developments call for paying close attention to customer profiling, as well as segmentation.

Introduction of hi-tech product to the market. Introducing new hi-tech product to the market is usually associated with one of the highest risks among other new products – only 37.5% products succeed, followed only by the industrial goods introduction – 45.5% success rate (Goldenberg, et al., 2001). One of the important product success determinants would be some customer need recognized and supported by the product, which allows to some level to predict product success already in the ideation phase (Glodenberg, et al., 2001).

Introduction of hi-tech product to the market is generally referred to as technology push in the literature (Luong, et al. 2008, Chidamber, et al., 1994, Horbach, 2012, Giada, et al., 2012). That also means prevalence of the supply-side markets in marketing the hi-tech innovations. Most of the studies highlight crucial role of demand for the innovation success, which requires the company to possess certain competencies to recognize and anticipate it. Illustratively, hi-tech software companies, focusing only onto latest technology developments and seeing only technology superiority as main success attribute, failed during their internationalization (Ruokonen & Saarenketo, 2009).

For instance, the interrelationship between technology push and market pull has been summarized in the framework of innovation readiness to the market, created by Paun (2011), where the various levels of technology and demand readiness plotted one against another show various strategies for further improvement or strategic alliances with distributors or R'n'D centers. Technology Readiness Level indicator was originally introduced by the NASA (Mankins, 1995), then this tool of assessing the technology maturity was offered to use in the practice of Department of Defense of the USA (General Accounting Office, 1999). There are 9 Technology Readiness Levels, starting from scientifically observed basic principles of the technology to be developed, through various stages of readiness, including components preparation (TRL5), prototype testing in a relevant (TRL6) and operational (TRL7) environment, up to actual system integrated (TRL8) and proven in a relevant environment. However, when the

technology is attempted to be marketed, other factors come into play as well, such as, for example, Demand Readiness Level, defined by Paun (2011) as levels of the ability of the innovation team to actually hear the voice of the customer and develop an appropriate response. Demand Readiness has 9 levels as well, spanning from just sensing that "something is missing" through ongoing specification and elaboration of the response to the market needs up to introduction of tested response to an expressed market need (Paun, 2012). Taken together, these to indicators position the company according to its capability to build an advanced technology and capability to actually bring it to the market. The Figure 6 depicts conceptualized collaboration recommendations for both hi-tech company, represented by the Technology Transfer Office and the company, actually able to bring the innovation to market, here denoted as Exploitation Actor (Paun, 2012).

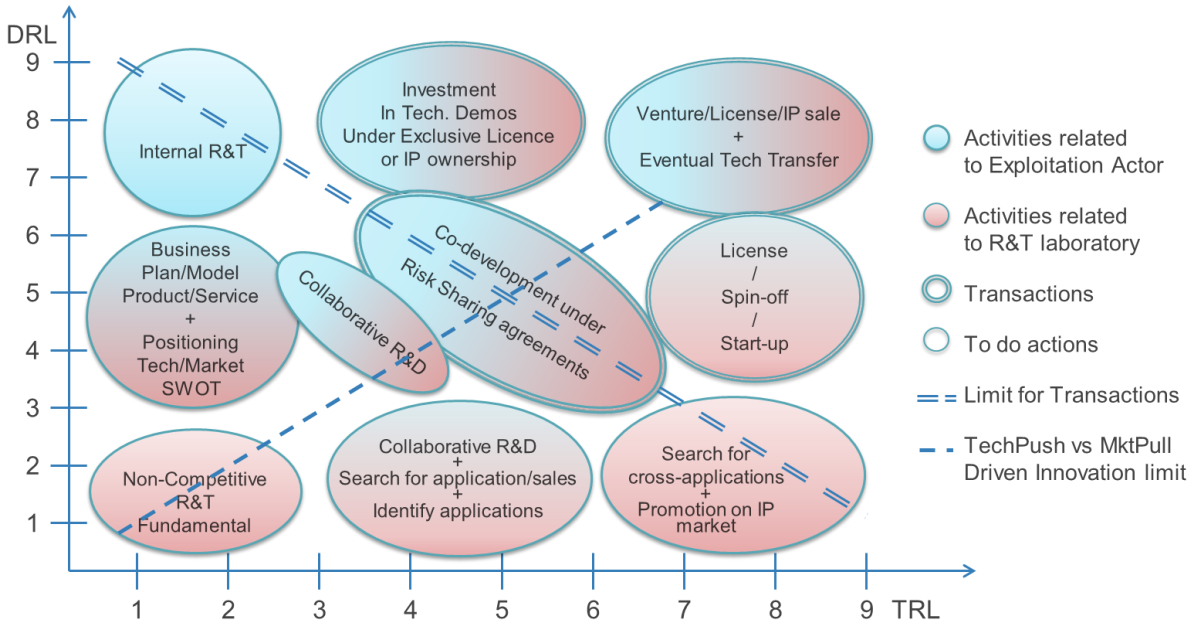


Figure 6 Types of TTO and corporate partnerships (Paun, 2012)

The collaborative character of hi-tech companies activities for market entry, depicted in the Paun (2012) innovating framework, is also associated with company's likelihood to increase its exports and succeed in international markets (D'Angelo, 2012), with a remark that those market should support the quality differentiation (Blyde, et al., 2015).

Another comprehensive framework to describe importance of demand for innovators was developed by Biegl, et al. (2014), introducing concept of marketing testbed – a preliminary testing market for innovation before introduction to a broader audience. In a way this concept, although including the technology acceptance model, conceptualizing market pull and technology push via framework of Paun F. (2011) resembles the lead user theory, introduced by

Urban, Glen L., and Eric Von Hippel in 1988, and the community-based innovation concept, where the users, potentially facing the first the problems, which the company is solving, are engaged at various stages of innovation process (Hasenauer R. 2009).

However, due to the hi-tech market characteristics and prevalent strategies, outlined above, the marketing capability, namely listening to the market, marketing research, user needs and profiles identification, segmentation, targeting, positioning in a highly volatile and unpredictable environment, especially for more radical innovations, remains a challenge for innovation-driven companies, worsened for instance by the lack of marketing professionals in highly R&D-oriented hi-tech companies (Gliga & Evers 2010). Moreover, tight competition in the hi-tech markets puts more pressure onto the company to gather and analyze customer insights (Kou, et al., 2015).

Hi-tech segmentation and hi-tech communication channels. Customer segmentation has in recent years both experienced a transformation as a broad technique, as well it has been enriched with various approaches specifically towards hi-tech market segmentation. Exemplary in this case is the work of Shin et al. (2013). Whereas the hi-tech products are generally characterized by their complexity, failure to recognize which usually diminishes project performance (Floricel, et al., 2016), traditional segmentation methods focused mainly either on customer profiling, or on the retrieved benefit or usefulness of the product to the customer, or both (Wedel & Kamakura, 2012). This complexity fosters a more detailed view onto product features, especially given, for instance, the various features of hi-tech software products recombination potential to transform into a new product (Chang, et al., 2015). Similarly, Christensen et. al. (2005) note insufficiency of segmentation by customer type due to later being forced to develop products for an average customer that does not exist in reality. Opposed is offered job-based segmentation approach, where distinct user objectives are united into more encompassing categories of the jobs the products can do (Christensen et. al. 2007).

Another way to look at the customer segmentation for the software products, as shown by Shin et. al. (2013) for Korean hi-tech market for mobile handsets would have to bring together customer values and specific products features, united via domain-specific values, namely the attitudes of the customers towards particular features of the product. Suggested methodology involves generation of the basic segments based on product-specific benefits and domain-specific values, check of those segments stability via the level of sameness with the general segmentation based on customer characteristics, and profiling, applying customer characteristics, usage patterns, and product characteristics (Chang, et al., 2015). Similarly, research done by Sell & Walden (2012) confirms the greater level of attitudes-based segmentation compared with traditional socio-demographic segmentation.

For hi-tech and innovative products in general it is common to apply the theory of the technology adoption to stratify the potential customer on the basis of their potential of innovation acceptance. For instance, the company can focus on one of the following categories of Product leader, fast follower, customer Intimate and Operationally excellent, shaping its marketing strategy and preceding market research. So Product leaders are early adopters and innovators, valuing new products, even incremental innovations, captured by speed of delivered value, Fast followers, which can be traced back to the early adopters and early majority together, value superior products, radical innovations, lower cost. Early and late majority constitutes last two categories, Customer Intimate and Operationally excellent, first valuing customized and excellent service in narrow niches, second – best combinations of quality, price, easiness to buy, being mass market (Mohr, et al., 2009).

Speaking of customers' segmentation is worthy to mention, that customers can be categorized also in the following groups, varying on the level of direct interaction with the product and actual involvement into payment: the buyers, the payers, the influencers and end-users (Mishra, 2015). Another common way to segment the market is vertical or horizontal, where vertical segmentation detects needs specific to the customer's industry and horizontal applies to different needs, shared by customers across the industries (Mohr et al., 2009).

Proper segmentation combined with targeting the resulting segments practices results in the clearer message of the hi-tech product benefits and thus aids the product diffusion (Easingwood & Koustelos, 2000). Due to turbulent character of the market environment, companies should be ready to react to the market changes and learn on the way, offering new products, or redefining customer segments and associated marketing strategy (Ruokonen & Saarenketo, 2009).

Buying center. Reviewing the value formation of the hi-tech product in the customers' eyes, it is also necessary to note the buying decision-making of other companies, which are frequently the customers of the hi-tech products and services vendors. According to Hasenauer, et al. (2013), the buying center is often a multidisciplinary team which is heavily influenced by the criteria of the innovativeness degree, testability, controllability, compatibility, implementability, assimilability during buying the hi-tech product or service. Another issue is the necessity of multidisciplinary communication within the buying group, similarly to the hi-tech company, which unites technology push and market orientation, for better communication having to translate the technology specifications into customer's language.

Place of the communication in the market launch of hi-tech products. Communication, its various types or integrated marketing campaigns, has an important role in the initial product launch and subsequent market success; informing through advertising and other communication

strategies are proven to increase product adoption, which, in turn, positively impacts company's financial performance (Gruner, et al., 2010). Classifying the communication as traditional, technology-based and participant media communication, Gruner et al. (2010), for instance, have found that participant-media communication usage is consistently and positively affecting the product performance, participant-media communication meaning that two-way communication is possible, such as in online communities or social networks, whereas the usage of traditional and technology-based have diminishing effect onto product success due to one-way direction of the communication and its non-personal character.

Strategy of product introduction is essential for hi-tech market, even more than for products of other industries, including such issues and timing to entry, entry modes, etc. (Wang, Kung-Jeng, and Yuliani Dwi Lestari, 2013). Due to complexity factors, listed above, failure rate of hi-tech product launch failure is higher than in other industries. Discussion of market entry for innovative, hi-tech products emphasizes the necessity of proper communication with and to the market, which is crucial both for shaping the products according to the customers' needs (Mahr, et al. 2014) and for bringing the product to the market. For instance, Chen C.-W., et. al. (2007) emphasize the clarity and uniformity of the message, along with integration of the communication.

Important is not only to gather customer insights via traditional marketing research methods, but also integrate their feedback throughout the whole innovation cycle, from the idea generation phase up to the new product launch (Bosch-Sijtsema & Bosch, 2015). The communication types with the customers identified by Bosch-Sijtsema & Bosch (2015) range from active listening by the company to active engagement of the lead users into the innovating process. These practices vary across the whole innovation cycle. Thus, just before commercial development testing the features with the users spanned from rich qualitative input via dialogues and crowdsourcing to a/b testing and quantitative log information. The study concludes with the statement, that qualitative input from users, conscious about the research objectives is particularly meaningful during earlier stages of product development (Bosch-Sijtsema & Bosch, 2015). Customer orientation is assumed to be largely supported by the customer integration into the product development process, and becoming largely supported by the virtual user integration via internet-based communication platforms, intended for one- or two- directional cooperation, although two-directional cooperation is rare to be successfully implemented (Rohrbeck, et al., 2010). Research (Chang & Taylor, 2016) shows most effectiveness of customers' introduction into new product development for company's further financial performance exactly in the ideation and launch stages. Importance of communication during the adoption phase cannot be underestimated, as failure to proper communicate and formulate the product benefits is listed

among the major failure causes of the innovative product during market entry (Davila, et al., 2012).

Market orientation is company strategy, manifested in the organizational culture, fostering gaining and spreading relevant to the company's business information about customers and competitors and other market factors and appropriate course of action based on the gained knowledge (Madsen, et al., 2015). In the recent decades effectiveness of not only market orientation, but also customer orientation is highlighted, implemented through relationship orientation approach, which focuses on building relationships with key stakeholders for successful market activities, especially market entry. This is especially important for hi-tech companies, which need to shape their communication considering the diffusion patterns and presence of multiple types of the stakeholders, such as users, advisors, decision makers, both in the B2B and B2C realms (Viardot, 2004). For instance, the hi-tech company gets more stakeholders in the case of involving the OEM, original equipment manufacturers, strategy, where the company issues license to manufacture and distribute its production (Easingwood & Koustelos, 2000; Glowik, 2009). Also engaging into collaborations and alliances is positively associated with the hi-tech company innovating and exporting its production (Lachenmaier & Wößmann, 2006).

Relationship orientation emerged in the 1980s, when the need was realized for more cooperative interactions between the company and the customer as well as the need to go beyond one-time transaction towards the customer life-cycle, fostering repurchases and brand strengthening (Moses, 2015). Nowadays relationship marketing practices are considered to enhance trust and loyalty of the customers via enhanced quality and communication, interaction and relational contact with the stakeholders, with some specific instruments highlighted: direct marketing, database marketing, customer partnering, one to one marketing, customer relationship management and services marketing (Agariya & Singh, 2011). Relationship marketing may be seen to involve two stages: establishing of the relationship and strengthening it, with former stage especially dependent on the communication and trust components (Khojastehpour & Johns, 2015). Research (James, et al., 2015) has identified certain key components of successful relationship marketing: proper account management, aftercare support, product and service development, relationship communication, software functionality and quality, trustworthiness of the supplier and requirements communicated clearly, highlighting vital role of personal, human interaction in these activities.

Communication aspects to be included in this realm are its timeliness, frequency for opinions to be expresses, effectiveness to communicate properly new products and avoid conflicts (Moses, 2015). Such measures include opinion leaders' involvement, awareness

building before the product launch via conferences or training for potential early adopters or even advisory board meetings for payers and buyers (Matikainen, et al. 2015). Seminars and presentation, educating potential customers and distributors are widely used tools, as well as sales communication materials, including brochures, catalogues, promotional souvenir production, direct, online, mobile marketing (Viardot, 2004). Relationship market may be also seen integrated into the lean startup strategy of software companies development, where three strategies of growth are viable: leveraging the relationships with existing customers for greater value through prolonged customer life-cycle, then employing viral effect, when customers find new customer for the company, becoming brand evangelists, or seeking means to extract greater value through lower costs or greater revenue on existing customer relationships model (Ries, 2011).

Also the positive effect of customer satisfaction boosting practices, such as Relationship Marketing, Product, Positioning, Promotional practices influencing directly the company's performance and Relationship marketing, Product, Positioning, Social Media and Targeting practices influencing the company's performance indirectly (Moses, 2015). Social media practices are seen as one of the major instruments for listening to and engaging the customer, especially in the B2B marketing domains, having low response time and thus supporting trust building with new and existing customers and leveraging relationships.

Overall, hi-tech marketing communication instruments tend to involve more customer care and consultation services rather than advertising or promotion and especially important is WOM – word of mouth (Siems, 2012). Word of mouth can be classified as pWOM – word of mouth through personal, face-to-face interconnections of people knowing each other, vWOM – through virtual setting by strangers and wWOM – in printed publications, newspapers and magazines and depending on the source it may have different impact onto perceived usefulness of the innovative product. Kawakami & Parry (2013) find the sequential influence of perceived credibility of WOM onto perceived usefulness and perceived usefulness onto purchase intent, also positive relation of the perceived usefulness to perceived availability of the complementary products. wWOM and vWOM were perceived by customers as providing more credible information compared to pWOM due to wider information variety and higher chance to find experts, and perceived availability of complementary products was associated with pWOM and wWOM. Perceived size of local adopter population was enhanced via pWOM. Also time issues of the product diffusion stage was mirrored in finding, that customers are more likely to estimate perceived size of the adopters population and amount of complementary products through vWOM, as pWOM and wWOM are considered credible for more mass adopted products. In line with integrated marketing communications strategy, leveraging WOM is suggested to be done

through all channels, written, personal, virtual, via practices encouraging "(1) adopters to share their product experiences and evaluations in personal conversations and through websites, blogs, and chat rooms and (2) experts and opinion leaders to try innovative products and publish reviews in newspapers and other print media, as well as online." (p. 1125, Kawakami & Parry, 2013).

As in Easingwood & Koustelos (2000), targeting different innovators segments requires different targeting strategies, also impacting the communication channels to be used. So, regarding the two most frequent cases of innovation marketing – new product introduction and crossing the chasm for disruptive innovations, the exploratory marketing research strategy would be appropriate towards identifying and targeting early adopters, whereas crossing the chasm requires tight focus on the niche market, so-called bowling alley technique, choosing the beachhead market, and direct marketing (Easingwood & Koustelos, 2000).

Adoption factors, according to the Technology acceptance model, are perceived usefulness and perceived ease of use, along with willingness to pay, which, when recognized and applied consequently in the product positioning, lead to enhanced product's benefits articulation and communication (Mohr et al., 2009). Rates of adoption can be tested and enhanced via preannouncement strategy, although the preannouncement is very dependent on timing, market competition and actual delivery of the product (Su & Rao, 2010). The adopters population may reinforce itself through two types of network externalities, when the prospective customer perceives the product as more valuable, considers the perceived usefulness to be higher, due to existing adopters' amount and due to existing complementary products (Kawakami & Parry, 2013).

Market entry modes. Another important factor, when considering the communication instruments for hi-tech companies during market entry is actually the market entry mode, which is especially relevant for companies, willing to internationalize either from the very beginning, becoming born global companies, following more traditional, stepwise path to internationalization, or internationalizing rapidly as "born global again" after some performance level achieved (Ojala & Tyrväinen, 2006; Bell, et al., 2003). The born global strategy is characterized by focus on the niche market and the "lead" market, first product adopters on international scale, as well as propensity to use greater variety of instruments of international presence rather than just using agents or distributors. Common strategies would involve expansion through value added retailers, acquisitions, licensing, customers or suppliers alliances. Distinguishing between various modes of market entry, the greater reliance onto the knowledge as competitive advantage would lead to inclination to target global niche markets. So the "Born-again Globals" according to such classification would be likely to either follow the clients'

networks internationally, or shift to targeting "lead" lead markets, internationalizing very fast to secure first-mover advantage. The "Born Globals" could be thus classified as knowledge-based companies, such as software development and other service companies, and knowledge-intensive companies, using the knowledge to develop new products or enhance current processes, but not necessarily as a competitive advantage (Bell, et al., 2003). Evidence from emerging markets suggests, that to achieve competitive edge in the new market, despite the ubiquity of digital communication channels, the software companies are more inclined to engage into high-commitment entry mode (Jain, et al., 2015).

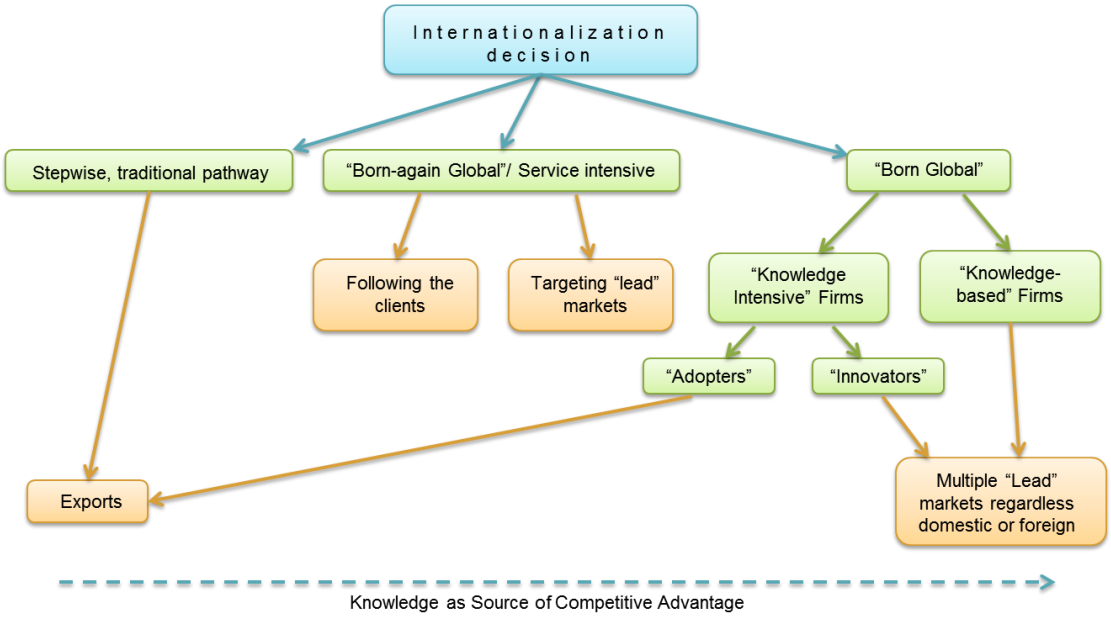


Figure 7 Market entry modes in relationship with knowledge intensity (Bell, et al., 2003)

Communication was found to be one of the most urgent problems during foreign market entry, although diminishing as the company gains experience, specifically, its costs, putting digital communication into a more favorable position, as found by Bell (1997). Although for the B2B company success in the hi-tech market as well the offline presence was crucial to get market penetration, ensuring face-to-face contacting, trust building, facilitating B2C follow-up communication as well (Sinha, et al., 2015). Entry to smaller but non-speaking English markets generally is postponed or even cancelled due to the lack of resources to overcome linguistic barriers and psychic distance (Sinha, et al., 2015). Market orientation, comprised of customer and competitor orientation, is also found to be present at different levels depending on the level of the internationalization of the company, most customer orientation present at domestic new ventures and "Go Global" ventures, competing worldwide on certain niche market, as depicted in the Figure (Madsen et al., 2015).

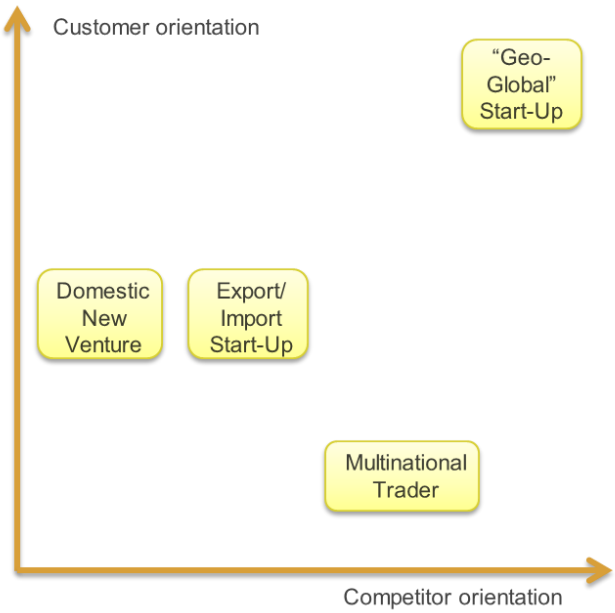


Figure 8 Customer and Competitor orientation depending on the level of company activities internationalization (based on Madsen et al., 2015)

The buying process in the software industry is very specific, divided into installation, implementation, maintenance and support stages, which also made communications more expensive due to necessity of personal demonstration and installation in case of complex high-end software solutions (Bell, 1997). However, short software products' lifecycles fostered the companies to pursue all available markets and enter multiple foreign markets at once (Bell, 1997). Ojala & Tyrväinen (2006) found, that the product strategy, service and implementation strategy, as well as complexity of the product and requirements for customer support affected the market entry mode, whereas whether or not to cooperate with distributors was mainly impacted by the product strategy. For those, already cooperating with certain distributors in domestic markets, foreign market entry was also facilitated via those distributors' distribution networks in other countries, same true for existing client relationships (Bell, 1997). Longer downstream supply chain includes partnerships with different stakeholders on various bases. Some roles of the downstream supply chain were summarized in Ries (2011), which include different levels of product modification for the end-user, as shown in the Table 1:

Table 1. Software company downstream partnership opportunities (Ries, 2011, p.52)

Downstream partners roles	Function
System Integrator	End-users needs definition, consultation, custom solutions development
Solution provider	Service based on self defined user needs
(Value added) Reseller	Configuration and integration of products, turn-key solutions
Volume distributor	Packaged goods/software products distributor
Retailer	Business front-end sales partner
Sales agent/representative	Third-party software vendor, revenue = fees from sales
Independent software vendor	Software provision with no contract
Influencer, consultant, etc.	Commentary, evaluation, advice and guidance to end-users
Original/own equipment manufacturer	Privately labeled product provision

Hi-tech and B2B markets. Another issue is that hi-tech market introduction revolves mainly in the B2B realm, still due to the complexity of the underlying technologies. According to the industry statistics, crucial for the B2B marketing, and specifically for industrial marketing is personal selling, greatly supported via digital communication channels, although wisely combined with offline events and promotions (King K.A. 2015). Digital communication channels include various online marketing, social media, interactive media and online communities or similar virtual environments means, where the marketer is not broadcasting the company's message, but aggregates the content and engages customers into active community participation, nurturing customer content creation (Karjaluoto, et al., 2015). Still, survey among industrial B2B companies speaks more for using digital communication for raising brand awareness and getting new customers. More specifically, e-mail is used for newsletters and events invitations delivery, with high perceived effectiveness due to time convenience, and high efforts for personalization, digital magazines, blogging, user-generated content and communities in social networks. Another direction is employing interactive content to support sales and marketing communications, such as videos, animations, interactive digitized content, maintaining relationships with existing customers and stakeholders. Important is empirical evidence of some industrial companies that online communications often do not capture attention of actual buying decision-makers. Thus the funnel strategy is employed, when through social media, online search and context advertising the traffic is driven to the website, which is properly designed to include call to action and valuable free content for target audience in exchange for e-mail and other contact details, also called lead generation, later used as starting point for selling process. An obstacle of trade secrets and related business specific information is found to impede open and effective usage of social networks (Karjaluoto, et al., 2015).

Evidence from scholarly research, aimed specifically at building software business models suggests, that communication and distribution tactics of the company depend on the customer served. Schief & Buxmann (2012) propose a specific software business model, where the choice of target customer is interrelated with distribution channels and influences support and standardization modes. Evidence from Rajala, et al. (2003) elaboration on software business models suggests certain interrelationship between product strategy in terms of its customization or standardization levels and choice of distribution channels, spanning from centralized and collaborational, using reseller or agent, republishing or OEM model to distributor and dealership and further to decentralized, transactional distribution. Rose (2012) summarized software business models based on the degree of involvement in customer relationships and the offering's homogeneity of the offering, each strategy corresponding to certain customer relationship type, as show in the Figure below:

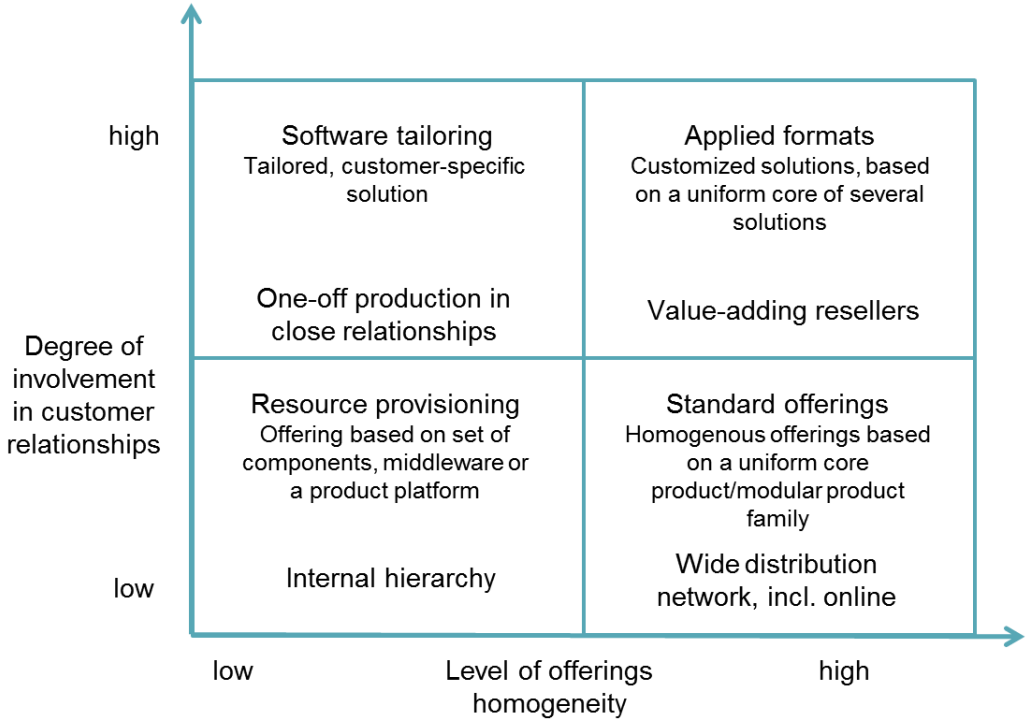


Figure 9 Product and corresponding distribution strategies for software companies based on offering heterogeneity and customer relationships involvement (Rose, 2012)

Conclusion.

As mentioned above, hi-tech companies, and especially hi-tech companies operating in the software industry, need the necessity to bring technologically complex product to customers in an environment, which is market, technological and competitors' uncertain. Bearing in mind the intangible nature of the software products and services, it becomes clear, that traditional internationalization and market entry approaches are not viable, and the company which

positions itself as possessing necessary expertise to compete in the global markets is more likely to focus on the "lead" markets, leaving the entry mode decision to the strategy considerations. Numerous studies investigate the strategic market entry decision-making or strategic marketing, however, less studies investigate the specificities of hi-tech marketing, and hi-tech communication of software companies to their customers.

Communicating hi-tech product value is very important for its survival. Customer-centeredness, as part of company's general market orientation strategy, solves the immanent technology push problem, as it is focused on joint development of common goals of the customer and marketer concerned and implies proper identification of the customer needs (Whiteley, 2008). For proper customer identification the hi-tech company presumably can employ various customer segmentation techniques, based on the value seen in the product, adopter profile, willingness to pay, lead user and technology diffusion theories, as well as variations of the technology acceptance model.

Thus the formation of the decision-making framework, allowing the hi-tech company, more specifically, the software hi-tech company, to communicate its product message to its prospective customers is presumed to be necessary. Hi-tech company communication to prospective customers, linked to the market entry, is a research gap. The current research is intended to make a contribution to overcoming this research gap.

1.3. Research problem, objectives and delimitation

Research gap. Research gap: no evidence is found for conceptual structuring of the communication policy of the hi-tech companies during the market entry phases according to the market and customer readiness for the innovation or the hi-tech product. One of the few related researches on the hi-tech communication focuses specifically on the corporate communication (Veilleux & Haskell, 2007), while the company may still want to access their customers directly, for instance, due to the nature of their products.

Research question. How a hi-tech company may choose appropriate communication practices for the certain customer groups during market entry? How does technology readiness level and market readiness level affect the communication channels to be used?

Study objectives. There is a set of study objectives to be covered:

1. First block of objectives is related to the choice of appropriate methodology underlying the framework building;
2. Second block of objectives is related to determining the sample and interviewing procedures of prospective customers, categorizing them according to job-to-be-done,

circumstances, objectives, adoption factors (drivers and deterrents), and general innovator profile, extraction of valuable insights about communication outreach.

3. Third block of objectives is related to building the advisory communication framework based on the Marketing Testbed method and customer insights analysis

Delimitations. Major delimitation of the current study is the industry of the companies involved into the research, namely the software industry, as most of the hi-tech trends occur in this domain (Gartner Press-Release, 2015), this industry is very fast-paced and growing, making development of the new products and efficient bringing them to the market highly critical, so the delimitation concerns also chosen segment of the industry, SME producing storage systems.

Another delimitation, imposed by the researcher's capabilities to perform the research, concerns the geography of the companies studied, namely Austria and Russia, which both have highly developed software markets, but the student capability for the sufficient sample outreach is limited.

1.4. Research methodology and organisation of the study

The research methodology bases on the Marketing Testbed method, proposed for assessing the opportunities and the test markets for the hi-tech companies during market entry. Conceptual communication framework will supplement marketing testbed methodology with recommendations regarding the communication channels will be built based on case study method, using multiple cases with embedded interview elements with prospective customers of the companies and with the companies' representatives in order to assess the hi-tech product's readiness to market, potential risks and constituting complexity of the products. Data collection method is proposed to be via qualitative interviews, allowing comprehensive analytical generalization of the results to be found.

The study is organized as follows. First of all, the introduction highlights relevance of the proper communication of the product message to customer by the companies, provides with acknowledgements, and overview. Following the introduction, Chapter 1 describes current state of the art of investigating the communication of the hi-tech companies with the market, discovers potential research gaps, study objectives, limitations and delimitations, organization of the study.

Next, in the Chapter 2 the methodology is set up, involving the conceptual framework of the case study and actual methods of the research, data collection and data analysis.

The chapter 3 describes the empirical results found and summarized them into an analytical framework of hi-tech company's ways to engage into communication with their customer, based on the customer insights.

The chapter 4, which is named Discussion, analyzes the place of the findings in the preceding research, practical and theoretical findings.

1.5. Summary of chapter 1

1. The research question is how a hi-tech company may choose appropriate communication practices for the certain customer groups during market entry? How does technology readiness level and market readiness level affect the communication channels to be used? The research gap is identified in hi-tech company communication to prospective customers, linked to the market entry, the result of this study will propose a framework for hi-tech companies structuring their communication policy to prospective customers during market entry.

2. The research is organized as an exploratory case study of one software company intending to enter new markets. The data is collected via semi-structured problem-oriented interviews with company' representatives and their prospective customers.

3. The methodology of the study is exploratory single case study. Data is company's insights about the technology readiness level of their product, customer insights about their needs in relation to the case company's products and about communication channels via which they could be reached.

2. METHODOLOGY and THEORETICAL STUDY of PRODUCT COMMUNICATION FOR HI-TECH COMPANIES DURING MARKET ENTRY PHASE

2.1. Starting point of approaching product communication for hi-tech companies during market entry phase.

The starting point of approaching hi-tech communication builds on top of the theoretical research in spheres of marketing and corporate communications, hi-tech companies entry strategies, hi-tech marketing and communication specificities, customer segmentation approaches. However, as previously identified in the literature review, not enough attention is given for advisory guidelines for the hi-tech companies for marketing communications during new market entry.

Thus the *Problem Statement* is as follows: formulation of the decision-making framework for a hi-tech company for choosing communication channels with their prospective customers. As the something, the problem is further narrowed down to this framework formulation for making the choice, whether to enter the market using own resources, or via various distributor agreements.

Conceptual framework – Marketing testbed

Development of hi-tech products is a costly and knowledge intensive, so is development of software prototype. This fact is already embedded into various software development strategies, where first customers through usage of the first product versions, beta-versions, prototypes, report the inefficiencies to be fixed, or lean-driven development (Rose, 2012). Even the beta-version might become too costly to reengineer. Similar idea is embedded in the concept of Marketing Testbed, developed by Hasenauer, R., Schildorfer, W. and other fellow researchers during the activities of EU-government fundend hi-tech centre, supporting hi-tech innovations. Marketing Testbed is an approach focusing on the technology and product acceptance by the customer via such instruments as perceived usefulness, perceived easiness of use, willingness to pay. The segments formed based on these parameters, are later assigned marketing mix elements, which are tested via problem-centered interviews. (Hasenauer, et al., 2013).

Similar approach is used in the customer development model by Steven Blank (2013), which builds on a same with Marketing Testbed approach premise, that most technological companies have focused on the notion “We will build it and they will come”, which is claimed not to be true for many of the hi-tech companies except bio-tech and similar. Therefore the customer development model is proposed, which builds up on 4 stages: customer discovery, customer validation, customer creation and company building, and for market entry preparation

essential is the first stage of customer discovery, where the hypotheses regarding how well the customer needs are met with existing problem and product concept are tested, as well as the overall vision of the product that the company has. That is done via directly engaging into conversations with prospective customers to potentially discover uncovered needs (Blank, 2013). Due to the product nature and the researcher's capabilities, in this case it is more about problem validation in the market, including such stages as "friendly first contacts", "Problem presentation", "Customer Understanding" and "Market knowledge" (Blank, 2013, p.26).

Technology Readiness Levels and Market Readiness Levels provide with a tool for assessing the multidisciplinary communication between technology provider – hi-tech company, and market representative – customer. More specifically, the concept of multidisciplinary communication also involves communication within the selling and buying centers, as both hi-technology product marketing and choice of the hi-tech product to be bought from the customer side at least in the B2B markets often involve collaboration between various specialists, for instance, R&D and marketing or R&D and purchasing departments (Hasenauer & Schildorfer, 2014). The TRL-MRL level of convergence, measured by degree of TRL and MRL scores similarity, shows the risks company faces, underusing the communication channels and market understanding, or underdeveloping the technology underlying the product. The TRL measure consists of TRL score, Integration readiness Level, Manufacturing readiness Level and Intellectual Property Readiness Level. The MRL measure includes Demand Readiness Level, as in Paun (2011), the Customer Readiness Level, Product Readiness Level, and Competitive Supply Readiness Level, which, due to ongoing development of the Marketing Testbed approach has not yet been assigned precise 1-9 or 1-10 scores measures, and therefore is included into analysis of the cases in the Chapter 3 only indirectly. The direct measures of the Readiness Levels are included into Appendix 1.

Alternative methods in this case would be design thinking and lean startup approach – both employ user-centered or customer oriented approach, both are more aimed at product, both have customer development methods, aimed at finding early adopters of the product. Similarly to Marketing testbed approach, lean startup starts already with some sort of business idea, while the design thinking starts earlier at problem reconstruction. Both methods involve iterations through various stages of idea development, going through prototype phase and its test (Müller & Thoring, 2012). Main goal is the innovating and learning themselves. The marketing testbed approach, utilizing the TRL and MRL diagnosis, is more widely applicable to the business ideas of hi-tech-products at various stages of their development, allowing to diagnose potential problems on the market realization or technological side and therefore seems to be more

practical in reconstructing such marketing mix elements as promotion, or in broader sense, structuring communication with the customer.

2.2. Method

Case study is designed as an exploratory single-case study with embedded units of analysis, such as the technology and market readiness of the product, and prospective customers with their insights on value seen in the product and communication channels this value could be communicated through. The sample due to the nature of the case study research method is analytically generalizable, therefore the sample size does not impose a restriction on the opportunity to generalize the results.

As in Yin (2003), the case study research design should be answering four case study design tests for validity: tests for validity of the construct, of the internal validity, external validity and reliability. These occur during the research design, case composition, data collection and analysis.

The construct validity test is met via covering two important issues: selecting the objects to be studied and connect them to the measures used (Yin, 2003). The object of the current study is communication practices the hi-tech companies can adopt to communicate essential messages for their business to potential customers. The measures established involved exploration of the content of the message the company would try to communicate, so the technological complexity, reflected via technology readiness level, revealed from the interviews with the company's representatives and secondary data such as prototypes and official descriptions on the company's corporate websites and internal documents, given to the researcher on the non-disclosure basis, the market readiness level and perceived easiness of use, revealed through in-depth semi-structured interviews with interviewees, potentially fitting the company's customer profile. The channels the message could be transmitted through are established using the secondary sources and research on the channels characteristics and the technological complexity of the product, reflected in its perceived value by the customer. The construct validity, as also suggested by Yin (2003) is enhanced via usage of the multiple sources of evidence (interviews and company's documents), via establishing the chain of evidence and draft case study report reviewed by the key informants.

Internal validity is not relevant in the case of the current research, due to the exploratory character of the current study, however still the alternative theoretical methods are still addressed (lean startup and design thinking strategies).

Reliability is ensured through outlining the case study protocol to be used when conducting each case study and the case study database, which for each case includes information on TRL and MRL evaluation and thematically structured insights from the interviews.

2.2.1 Study propositions

Chosen method of study organization, case study, requires developing certain propositions on the basis of existent research to be validated through data collection and analysis. The communication framework will structured based on several propositions about communication strategies.

1. Unfamiliarity of the product or company in the market suggests using mass communication techniques, such as press relations, publicity or sponsorship, as these are the communication techniques, aimed at building knowledge about the company, whereas building attitudes or fighting negative attitudes is better with personal communication, and influencing the purchasing or cooperating behavior occurs via personal communications techniques, such as events and direct communication (Veilleux & Haskell, 2007). These communication goals follow one another, so the knowledge building first, then the attitudes formation and behavior influencing, according to the classic AIDA (Attention, Interest, Desire, Action) or Hierarchy effects model, where marketing communication focuses on several stages of customer intent to buy the product: awareness and knowledge building as cognitive effects, liking and preferences formation as affective effects, and conviction and purchasing as conactive effects.

2. End-users and buyers/payers exhibit different preferences for being communicated by the company. This proposition bases on the difference the hi-tech companies also have between customers in the B2B and B2C sectors, where arguably the B2C customers require more branding efforts, as noted by Viardot (2004) and therefore marketing expertise. However the distinction Viardot draws relies mainly on the difference in knowledgeability of the B2C and professional customers, therefore such difference in preference might exist between end-users and various distribution partners, or between experts within multidisciplinary buyer's center within the company.

3. Company, having higher market risk, as estimated in the TRL-MRL framework, would need to collaborate with downstream partners to access the end users, and company, having higher technology risk, would have to collaborate upstream to compensate for the lack of the R&D expertise, although for the hi-tech companies in case the downstream partnership for distribution would be more likely. This proposition bases onto Paun F. (2012) theoretical

framework of collaboration of the Technology Transfer Offices with corporate actors, which in Paun terminology were named exploitation actors.

2.2.2. Case selection criteria

The case chosen follows the convenience sample technique, allowing the researcher to gain more in-depth information via leveraging personal network. Still, the case selection followed certain criteria:

1) Software industry and advanced algorithms embedded into the product. Although software industry as a whole is classified as a hi-technology industry, still arguably some products and services are more complex and advanced, than another;
2) International market expansion, introducing new product to the existing market;
3) The company should be a Born-Global, following the Knowledge-intensive and Inventor approach to the international market entry (Bell et al., 2003).

2.2.3. Data collection method

Qualitative semi-structured interviews

As suggested by Witzel (2000), primary research was conducted via qualitative problem-centred interviews with various categories of potential customers: end-users or buyers/payers.

Data collection

As stated by Mason (2002), most qualitative interviews are designed to have a fluid and flexible structure to allow researchers to develop unexpected themes. Thus, apart from having main topics, for both the end-user and corporate partner interviews several supportive questions were drafted in advance. These additional points were only addressed when they facilitated in getting an even deeper insight into the respondents views and opinions. For instance, for the end-user interviews some questions were only used for respondents inexperienced in mindfulness training.

Due to the product complexity of Raidix as well as the sampling, respondents were not able to see or test the solution during the interviews, although one of them already had it applied. Therefore, for Raidix-related respondents main focus was on identification of customer needs and feasible solutions. Drafts of the interview guidelines for the Raidix interviews can be found in appendices, Appendix 3.

Interviews were held on a one-to-one basis and protocoled right after the dialogue. Furthermore, impressions of the interviewee's general attitude or behaviour during the interview were noted down as well. The purpose of this was to get an in-depth feeling of how people react

when talking about the topic mindfulness and storage solutions. These impressions were highly useful for targeting and the communication strategies to be applied.

Interviewees sampling process. Primarily the researcher's own personal network was used also contacts were made via social networks and professional events web-sites. Additionally, some respondents were reached via the so-called snowball effect as their contact was forwarded by other respondents. The final sample of end-users consisted of 11 interviewees. In literature, there are various opinions on how large a sample should be. According to Mason (2002), it should be large enough to make meaningful comparisons in relation to the research questions, but not so large as to become so diffuse that a detailed and nuanced focus on something in particular becomes impossible. As a result, achieved amount of the participants for each case was considered to be suitable.

In order to conduct research that leads to valuable conclusions and to ensure objectivity, pre-defined sample criteria were used. Such an attempt is also suggested by Mason (2002). The sampling criteria were based on the presumed usage patterns of the companies' product, with following elaborations for each of them.

Main sampling criteria were the industry of the user, as it determined the usage patterns and level of the experience with storage products, for instance the companies in media industry and large-to-medium enterprises have different needs in storage characteristics, but also channels of communication, although both are likely to use services of third-parties, providing those companies with all IT solutions, including data storage and network services. So primarily the representatives of the filmmaking companies, postproduction studios, tv and radio broadcasting, home video production, telecom and video surveillance industries were targeted with primary focus on the filmmaking and postproduction studios, as the company already had a tailored solutions to their needs, and for others one would have been to be created.

Another main sampling criterion was the country, as the company was primarily interested in entering Indian market, along with all other foreign markets where it already operates or has entered. Also the main emphasis was put onto users and buying decision-makers of the product, so primary attempt was to ask either the users of the storage systems, or the decision-makers, technical support of the companies.

2.2.4. Data analysis method

To ensure comparability and objectivity in the analysis of the qualitative data obtained, excel sheets were drafted for the interviews. First, the data was reduced to the main topics previously identified. Respondents were kept anonymous by using an abbreviation of the first letter of the respondents and the interviewers' first name. Eventually the main results between

interviews of various groups within each case were compared and thereby resemblances and differences between the subjects were identified.

The data analysis was performed according to the theoretical propositions, outlined in the section 2.2.1. and the interaction of the Technology and Market Readiness Levels, defined for each of the customers' groups, as the base of building the communication framework.

2.5. Summary of chapter 2.

1. The problem statement is the following: formulation of the decision-making framework for a hi-tech company for choosing communication channels with their prospective customers.

2. The conceptual framework chosen is Marketing Testbed, which using similar to the Customer Development model customer interviewing method, and interaction of the Technology and Market Readiness levels, will help to arrive to a communication framework.

3. The chosen method is single-case exploratory case study, the validity, among other means, is ensured through case study protocol development.

4. The data collection method is semi-structures qualitative interviews and data analysis is performed according to the propositions and the conceptual framework.

3. EMPIRICAL STUDY of CUSTOMER-CENTERED COMMUNICATION FOR HI-TECH COMPANIES DURING MARKET ENTRY PHASE

3.1. Raidix company and product description

Raidix is an established software solutions provider, up to date supplying software-defined storage solutions for various markets, roughly segmented into media, healthcare and enterprise. Currently the business model relies onto business partners, integrating Raidix solution into their offerings and then working with end-users. The partnerships include partnering in revenue channels with solution providers and system integrators and sales support, co-marketing technological partnership with hardware vendors (Taratuta, 2013). However, different modes of market entry are considered, such as licensing or direct contact with the end-users.

The company's offering, namely the software-defined storage, has value proposition of enhancing the performance of Standard Server Hardware up to the level of the Professional High Performance Data Storage. It integrates with various hardware platforms, such as VMware Ready, AIC, LSI, QLOGIC, SUPERMICRO, ATTO, SmallTree, Intel, PROWARE by Unifosa. Currently the offering is tailored to three major segments, such as media, healthcare and High-Performance Computing, also developing the solution for mid-tier corporations.

Media solution description. It is specially designed for heavy data workloads due to work with high-definition video, intensive multimedia projects, media storage, film and 3D Animation. Media industry solution benefits are classified into 3 groups: tailored for filming, postproduction and broadcasting companies. For filming companies, actually shooting the film, where basically the solution offers storing and ingesting all the footage in one place. Then the postproduction solution, maximizing performance due to Qosmic addition, automatically adjusting bandwidth according to the running applications importance via self-learning algorithms and allowing up to 32 users to connect directly to the heterogeneous network, also ensuring cost-efficiency and data safety during postproduction works. And the broadcasting companies, where rebuild time of the system is accelerated, and during the rebuild the high productivity of storage is maintained, and guarantees data safety and no frames dropped even with many flows of Full HD and higher resolution running concurrently (Raidix, 2016).

Raidix already has a business partner in India, Bytescale Technologies Ltd, partnering since about 2012 (Taratuta, 2013), however the business of Bytescale does not seem actively developing, with no updates on the site, which is important for any B2B marketer, and with only one testimonial of one, but quite large client – post-production house. Therefore the customer development approach would allow to possibly uncover new opportunities for partnerships,

discover new needs and possibly the communication channels for marketing the Raidix solution in Indian market, specifically in the media industry.

3.2. Customers' classification

The customers groups, based on the presupposed classification according to the specific industries, outlined in the sampling criteria of the previous section, and the interviewees group which was available for the research outreach, are the following:

- 2 small filmmaking companies;
- small documentary production house;
- 2 postproduction studios;
- telecom company;
- TV broadcasting company;
- Home Video maker;
- 2 large international enterprises (airline and business information company)

Altogether 11 respondents.

The key needs, which were identified already in the company's media industry value proposition were confirmed, although sometimes indirectly, due to the interviewees profiles, who are mainly users of the storage and data management systems and are not as familiar with technical characteristics of the technologies they use, for most of them. Also, for instance, the small production houses and filmmaking studios are using the hardware discs, although complaints about its inefficiency in usage, as for storing large files it requires several discs, and data management in this case gets more complicated due to the accessibility issues, also the safety of the data question was raised. However, when asked about scaling their storage environment, or expanding it affordably, the only thing the customers could recall for the most part would be usage of cloud storage infrastructure, which implies that even if the Raidix company would try to address these customers' needs via various partnering and distributors' channels, the company would need to educate the market about the actual presence of various storage solution available. Another important factor, highlighted by one of the interviewees is anticipated growth of the industry, both in appearing new small companies and in the growth of the existing ones, which would mean, for instance, that mentioned by her postproduction studios, due to heavier data workflow already having more sophisticated hardware storage systems (as inferred from the description, Network Attached Storage).

The communication insights of the interviewees revolve mainly around the IT solutions buying decisions and some directly named means of communication. Therefore, the customers groups will be also analyzed based on the groups, outlined above: small filmmaking studios

together with home video producers and larger production houses, inferred from the interview with interviewee, who had an experience working with those, then the post-production studios, then the tv broadcasting company, the telecom company and the large data-management critical enterprise.

3.3.1. Large enterprise

Market overview

So for the large companies' representatives two Chief Information Officers were interviewed, and these interviewed revealed more similarities than differences in their approaches to data safety, vendor choice process, vendor choice overall. Such storage suppliers as EMC, NetApp, HP, IBM were named, with little attention to the software-defined storage systems or cloud storage systems.

> We work a lot with EMC, HP, Dell, we practically have all of them. But essentially a lot of our core compute and storage are from HP. But we do a lot of things ourselves also. So I had my compute for them, I have my network in use from Cisco, my storages between EMC and HP, HP is a bigger part, and the backup solution from EMC, they have their own stack of solution and etc, but we have our own stack for compute and monitoring bought from outside, BMC, which is one of the world's best monitoring solutions, ITSM (IT service management) solutions (Airline CIO)

> EMC is very expensive, not everybody can afford the EMC, it has the enterprise solution only. Only if I decide that my system should be very reliable, then I will go to the EMC, or I will go to someone even better than that, on the other side, if I am a smaller company, I might go to Dell, because Dell will cost you 1/5 of what the EMC system would. But there is a risk associated with it, so you might find that power modules might fail, or disc arrays might fail, or higher failure rate, but if you go to EMC, this equipment you it once and they run 5-10 years without a hiccup. So you are paying for cost and performance (Airline CIO)

> New products choice is influenced by the set infrastructure, so to expand it we consult existing vendors, such as NetApp, EMC, IBM mainframes, AWS, Azure. We have smaller order sizes with EMC, choose better NetApp. (Business information company CIO)

The airline company CIO confirmed that the data needs of the enterprise always grow, but due to the business specifics, where to grow you need to buy more planes, arrange more flights, the data needs do not grow very rapidly, whereas the business data provider's CIO mentioned abundance of the various sources of data, which is growing both in volume and diversity of the sources types. Also it was mentioned that:

> Nowadays storage has become the critical component of an IT infrastructure. That is because of the changes that happened in technologies. One of them is virtualization together with the cloud that have created the situation, where all the machines, what we call it, the instance, is actually kept in the storage. Thus when your server dies you can actually retrieve your machine and move it to the another compute environment. In addition to that instance you probably have some data which is stored separately. Both of these things reside on the storage. That is why now the storage management has become very complex. So one of the things the organizations are doing is virtualizing their environment, which gives them better uptime and ability to move things around, gives the elasticity in case if you want more performance, then you can move to a more powerful box.

This quote illustrates that the large enterprises have sufficient expertise in managing these complex infrastructure, having established specialized departments, also called IT architects, managing the storage solutions along with other enterprise solutions, also keeping them in line with one another.

Articulated needs

The 2 large enterprises, airline and business information company were sure in their preferences for the storage solutions and have their own buying centers for IT and other necessary solutions within the companies, and established procedures of the new equipment purchasing. The airline confirmed needs in storage would be the reliability of the storage due to the mission-critical operations in their data management, secured through established brands of their technological partners, also the compliance with existing ERP systems and the whole IT infrastructure was highlighted.

> So the storage is sought based on the I/O performance, which is input output which the company needs and is based on the size of data to be done. First of all the storage is build up on top of various application requirements. So the company has general departments – HR, finance, etc., and functional, business-specific. So each of these

departments has kind of a solution which this department runs. Also the solution systems have several subsystems within. So firstly production, then staging and testing, then backup would increase my storage from 100 Gb to 5-6 hundred Gbs outright.

Also the duration of the storing the archived data, as the interviewee has identified, depends on certain governmental regulations and also on the requirements of the functional departments, owning the data. “They recommend, I just specificate”. “Uses and needs in storage volume are entirely specificated by the usage of the ERP and other applications”

Planning the storage infrastructure involves decisions made on overall and spare capacity, data allocation to specific storage appliances. So the spare capacity is decided based on the business growth rate, and also on the time lag, about 3-4 months, needed to procure extra capacity. Also the spare capacity need was named as one of the reasons to use the cloud storage as well. The overall capacity is decided by the IT architects in the company, who go and ask the needs, goals and the structure of the department’s workflows for the solution being integrated, and then figure out “the I/O, the backup, which files will be reached, searched, used, etc. You have to propose question and work with the answer, then there simple formulas and rough calculations regarding required throughput, performance, latency, speed of the discs array, etc. Then I call to the service provider, ask to bring me a box of the solution, and I do proof of concept, and I will test it. And I will use these tests to determine what do I buy or not buy”.

Communication insights

For the large enterprises, where the data management is critical but does not constitute the core business activity, such as airline, another type of the buying process and, respectively, the viable communication paths were highlighted by the interviewee, who is herself responsible for IT procurement in the company. In this organization purchase of new solutions requires cross-functional collaboration of the functional department, needing, for instance, some IT solution, with finance department, assigning the costs, and IT department, choosing, trying and verifying proposed options, if any. Due to high complexity of the IT infrastructure, which is dominated by the chosen ERP system, corresponding data types and restriction in integration, also the specificity of needs, meaning high importance of proper data management, the organization watches closely IT and storage appliances market via specific industry reports by the technology consulting and research companies, such as Gartner, and chooses only large providers with established brand and reputation in the market, the brand securing the reputation.

So the established algorithm for setting up the new solution, chosen by the functional department, is as follows:

1) The functional department articulates the needs, and chooses some vendor (the SAP was the example);
2) IT architects specify the requirements for the SAP, needs, types of functions, types of users. Then together IT architects and SAP define the solution structure
3) IT architects define the infrastructure, which involves storage. “The infrastructure bases on three domains: network, storage and compute. You need certain performance on network, because the users will be all over the place, compute is the server, and the storage, which holds the data and the application instance together.” That involves the decisions on the amount of instances to be run, amount of concurrent processes and users. Here is when the storage choice is made, also accounting for the solution stack, compatibility list, provided by SAP, supported by their warranty that the storage from the list will work.

Due to the presence of different solutions systems, different storage types are used, “a NAS, DAS, SAS – everything inside a SAN. You can have a flash storage also in the SAN itself.” Thus the interviewee indicated, that the function determines the functional application to be chosen, and the application determines the infrastructure below it, indicating high dependence of the storage and other infrastructure choices on the ERP provider. However different the functional solutions, the storage infrastructure still needs to be brought into system, consolidated and integrated to be “not too complex to manage”. Another two factors are the performance and cost. So, “SAN is better performing, but NAS and DAS are cheaper. So if I have my mission-critical application, I would try to put it in a SAN, and archiving I would store on the DAS or NAS also. Today the data is stored in RDBMS – relationship database management system, developed by large and complex companies, and are provided by Microsoft, Oracle, there expensive, also free ones, like MySQL, the choice is also based on performance and cost. Then if we use SAP, SAP configures the RDBMS data”

Another criterion of data to storage the allocation was illustrated by the business intelligence company: Keep the private and confidential information in-house, put into the cloud the globally available information. Sparingly use the software-defined storage, the storage system is mostly hardware-based, use Amazon Webservices for the cloud.

The whole process of choosing some new solution, including in the airline involves the solutioning team of IT architects to work through the requirements that come from functional departments, or weekly system reports, or customer complaints on the system being too slow. They work together with interested parties, functional departments to identify the solutions and test them with the users. That supports the Gartner industry research findings, that the B2B purchasing process is driven by the cross-functional teams (Barnes, 2013). Then the IT architects

involve the procurement department to identify the cost requirements. About 3-6 vendors are found to make an intense negotiation and testing, involving colleagues from functional and procurement departments, forming a cross-functional buying team. All of that is a very standardized IT procurement process in both companies, both having the yearly technology plans for upgrading the technologies as well, for the storage solutions that is usually 3-5 years, more for 5 years, to "we try not to change the chosen technology, because you need to settle down, get people get used to it, get proof of concept from the vendors" (CIO of business intelligence company). When possible vendors have been identified, the requirements' specification list is sent to the vendors, with waiting for the reply about 100%, 50% or no compliance with it.

The usual criteria for partnering with vendors is to choose the companies which have to be doing business for more than 5 years, who have more than 10 large clients, all of them doing more than 1000 million dollars business, that have global presence. "I have to create a partner, platform ecosystem, see for whom am I doing it, would I go for a startup or not. For something small or side business I might loosen the criteria for choosing the vendor".

The normal communication channels, identified by the both enterprises are the following:

> Essentially we go to the market, search in the web, call up our colleagues who are doing something like that and we find out what works for whom. Exhibitions are low, may be tradeshows, and especially the working seminars, because if it works for somebody, then it will possibly work for me. So first I check what other businesses or functional industry are using, then I try to find which other systems are there, check with the social environment, get the contact points through that social environment, then we use a lot case studies done by the independent consultants, for instance, Gartner, independent research organization, so we use their research or we could use their consultants also, or maybe you might use a consultant like a KPMG. (CIO of airline).

> When we need to look for new technology, we use the Cognizant IT consulting company, we have a global contract with Gartner for benchmarking, pricing, because they are technology independent, and the existing vendors: NetApp, EMC, IBM mainframes, AWS, Azure. (CIO of the business intelligence company)

Another channel mentioned was the "shadow IT", when anybody can try to find a suitable solution without any IT support. The idea is that the functional department representatives, finding the solution this way, still should come back to internal IT department

and still work it all out, still it is said to be happening all the time, when more and more with SaaS solutions becoming more and more prevalent.

3.3.2. Telecommunication company

Market overview. Currently the market is characterized with expansion of the telecommunication companies activities, partially due to the expansion of the ambitious government project "Digital India". The project spans over several directions, including important for the telecommunication and digital industries in India activities, such as building broadband high speed highways, connecting all the rural villages and governmental institutions, provision with public internet access and universal mobile access (Rani S., 2016). Given high market growth rate in the previous years, which was about 17% up to 2012, due to the market openness to foreign investment and global players, and the opportunities unleashed in case the Digital India project gets implemented, the growth opportunities in telecommunication sector are large (Ilavarasan, 2014).As the interviewee from the telecommunication company has indicated, three telecommunications companies were given the contract to build optical fiber network, including the employer of the interviewee, BSNL, Bharti Airtel and some other company.

Another market trend, important for the storage solution providers as well as for IT infrastructure solutions providers, was the rising in-house integration of previously outsourced IT functions. Interviewee cited the case of Bharti Airtel: "It was the first company that outsourced their network maintenance; they outsourced their IT services to IBM. They outsourced everything, and they focused only on the marketing, and their services, and looking into customer services", however later on "2013 they have taken some services in-house". Supposedly the main reasons are the cost, gradually replacing the outsourcing strategy with cloud or managed services, becoming more prominent since the first negotiation of the Airtel-IBM deal in 2004, and other big players, providing the datacenter solutions, would be Tech Mahindra, Wipro, HCL Technologies and etc. (Jain, 2014).

Another opportunity for growth of the sector is mentioned in yet low penetration rate of the internet usage in India, how the interviewee has put it:

> In India now the voice use part of telecommunication is going down and the data part is going up, so you can say that the trend is in the near future that the data uses will be higher, and the data will be more as a source of revenue for telecom companies. You can see internet based calling apps, so the voice revenue is on the declining move. Also in India you can say that penetration is not that good, so in the last 4 years the penetration has only started in the rural areas. Hoping that in the coming 5 years the

more and more people will join and start using the data services, the future is data in India.

The industry is also government regulated, with special agency TRAI setting "certain KPIs for the BSC (base station controllers" for the drop call rate, and other connection quality parameters, and "you have to follow these norms, if you are defaulting on that, then you may be fined".

Articulated needs

The telecom company representative highlighted large volumes of data and specificities of the network management. Also the two types of data and related business activities:

The data infrastructure of the company's datacenters is comprised of Virtual SANs on fibre channel fabric and Web-based management portal for the clients managing their data, which cloud infrastructure was set up with the Dimension Data company (BSNL Internet Data Centre, 2012), another datacenter in Chennai having been set up with CtrlS datacenter infrastructure provider (CtrlS Press Release, 2015), another data center maintenance provider, mentioned by the interviewee for Chandigargh datacenter, was the Assia ltd. Set of data types used by the company were mentioned by the interviewee:

1) Customer side data: "data with time stamp how much data has he loaded, how much data has he used, call deal record, the billing has to be done by using that data, then the data which plan the customer is using, whether he has balance to go, so one data is the uses of the customer and other is customer-related data, to check who the customer is and whether is he allowed to do some things or not, and data from the billing angle, from the telecom company"
2) The other type of data is data that the company uses, analytics of the customer data usage trends. "In India there are 22 circles, telecom circles service areas, local service areas where we are operating. So you have to check with all the 22 circles, whether a particular area is contributing to this loss in the data uses or not. And then you have to analyze, as if there for example for 5 circles performing badly, other performing good, what is the reason". Also the analysis is done to determine "what should be the billing rate, charges we should apply to the customers to gain more customers and you have to the others also, should you lower your prices or not. So for that alo you have to check the data". "So there is the customer data and company data, based on which management decides, which new marketing initiatives will be taken in the circle, and then the data is used further for pricing the offerings."
3) And are the network related data, managed together with outsourcing partners, such as Nokia or Eriksson, Alcatel, Lucent, Huawej. Then the interviewee mentioned,

> that "BSNL and IDEA, there are these two companies, they have in-house people, their own employees, taking care of their network, whereas Airtel, Vodaphone, and other big players like Tata, they have outsourced their network operation." And the outage or power issues are checked via analysis of the standardized reports from the outsourcing partners.

All these needs, as mentioned in the market outlook and by the interviewee, are growing due to external factors and also the companies engaging into data storage provision services via the datacenters.

Communication insights

For the telecom companies all the data management is performed in the data center, due to the industry specifics in the country, which is very open for foreign participation, maintained via foreign global leaders, such as for instance, Nokia for the networks and IBM for storage, although the interviewee highlighted some tendency to take the services in-house, highlighting possible transformation of the buying decisions from the mediated via third partnering company to typical buying center, which in this case would be the data center managing subsidiary, illustrated in the case of Bharti Airtel by the deal of the Nxtra Data Ltd and NetApp for enhancing the Airtel corporate data centre managed services offerings (NetApp Press Release, 2014). Similarly Bharti Airtel has partnered with Hewlett-Packard (Singh S., 2012) and Amazon Web services (Airtel Press Release, 2015). The interviewee from the state-owned company highlighted, that their company also provides more operating freedom to their datacenter management:

> There is datacenter in Chandigargh. And there is a general manager over there, he is in charge of the datacenter, and there is a SCL team over there … the dealing with vendors is generally done by the general managers of the telecom and the vendor.

Where SCL is the SemiConductor Complex Limited, the India state enterprise for semiconductor operations and specialized equipment manufacturing.

Thus the communication advised by the interviewee was to work with the datacenter business unit of the telecommunication companies or the maintenance and datacenter infrastructure building companies, such as CtrlS, or HP.

3.3.3. Filmmaking companies

Market overview

The major and most famous player of the country's industry is certainly Bollywood, but also Tollywood and Kollywood. The local, namely South, production is also on the rise, with heightened interest of the broadcasters to the South productions, which are also cheaper to rent

than the Hindi films (Deloitte Touche Tohmatsu India Pvt. Ltd., 2014). The Bollywood production rates are comparable to Hollywood, and constitute about third of all films produced in India, and the amount of the films grows yearly. That is why these huge production houses have recognized the need for proper data management early and they continuously update used technologies, including the storage, for instance the Red Chillies Entertainments Pvt. Ltd. collaborating with Western Digital company and digital storage vendor on project-based basis for the second time with main goals of safe footage storage and easier editing and postproduction for special effects (Bollywood Hungama News Network, 2014). Same as in the filmmaking industry, and telecommunications, which are opened by the government for foreign players, there are certain solution integrators and digital consultancies, working specifically with technologies for filmmaking and editing stage, postproduction, such as Cineom Broadcast India Pvt. Ltd. or Digital Solutions, both offering for instance the US-based EditShare solution for networked share storage (Editshare, 2016), or for various international storage providers, such as Promise Technology Inc., Quantum, Infortrend (Cineom, 2016). Some low-end storage solutions are also on the market, offering cheaper but still reliable alternative to hard disks widely used in the industry, namely, LTO Linear Tape File System (StorageDNA, 2016). Also the issues of safe storage, backup and piracy are sometimes managed via custom building of necessary server and storage solution (Tollywood Nagar, 2015). Low profitability rates make even large production houses very conscious for the costs, concentrating in one location, spreading the costs across multiple projects, choosing low-cost locations for production, with critical areas for proper storage set up being the file rendering and migrating (Greenwald, 2012).

The new players continue to appear and the incumbents get bigger, as one of the interviewees put it:

> The film industry is growing in a very very rapid rates in this country. I think, as there is more demand, more opportunity, more companies start popping up, and I think more companies are expanding from just directing their own films to start producing other people's films, it is a legitimate way for expansion. But a lot of people are a lot more like independent films these days, because there is the internet and wider accessibility of video content, so there is a room for independence in production these days. So I think you will see small companies get more enterprising, and you also see individuals, young people kind of starting up their own web series, or their own production. Because they can, it's easy, relatively speaking, and there is a big market for it.

Also the difference from the US filmmaking market was noted:

> There is huge difference in making films in India and the US, in the US everything is a lot more organized, and you have a lot more middlemen to take care of different aspects

of production. It's a very well oiled machine and you have certain facilities in place to account for the fact that it is an industry that really depends on the freelance service as well, so there's a lot more people to do the work. And they also have a better sense of organization ingrained in their industry, and we don't. For us middlemen professionally are kind of a new concept

And there are certain institutions that are only now being put in place and people have to kind of get used to that. Like for example, there is the software people in the US use, called Showbiz, it's specifically for entertainment budgeting. Here people mostly work on Microsoft Excel, because Showbiz isn't a thing. So such kinds of things, that promote a more organized workflow.

The previous notice emphasizes the general development of the supporting infrastructure in the India filmmaking industry, which should be noted by the hi-tech companies like Raidix and other professional service providers, as the customer education may be needed to help the customer understand that the solution meets the needs he or she has not been really aware of. As the interviewee put it: "I think that more and more we are feeling the need for organization, so it's going to become necessary really soon, because it is already necessary now".

Articulated needs

The needs of the production house during shooting for the storage mainly revolve around the usage of the external hard drives, be it large production studio like Red Chillies Entertainments Pvt. Ltd., or much smaller production organizations, organizing the shooting of the movies and subsequently storing and transferring the footage and organizing other data. "We have used WD's internal and external hard drives to record the shoot, to create backup copies, and during the editing process," said Venky Mysore, CEO, Red Chillies Entertainments" (AnimationXpress, 2015). Although present, the needs do not really seem to be addressed, although most of the interviewees, having experience of work also with the larger production houses, note that there the data management and storage is much more organized.

So the general structure of smaller production companies was represented as 6-10 core employees with wide range of opportunities to work with the freelancers, such as cameramen, sound production, editors, scriptors, etc. Data storage problem is frequently solved by these companies via backing up all the data to external hard drives and daily sending directly to the editors, postproduction company, for editing, or just for storing, or, if the data volumes are not that high, storing on the home-made back-up systems.

The files are stored after the movie is shot, so the sound for instance is stored by the sound recorder, separately, on the separate hard drive, and the shooting itself is stored at the separate hard drive by the camera assistant. Then these hard drives reach the editing department. Nothing happens online, two separate hard drives, and a backup for each. Nothing very complex. Camera has own memory card, which is very big. Once the scene is shot, immediately after the shooting day the shooting is transferred to the hard drive, on the daily basis the files are transferred to the hard drive and sent to the editing department.

We try to finish the shoot at once, we tend to take our hard drives with us, because it is not very safe to keep the shooting in the memory cards, because you can just delete the scene in one click and it is hard to recover. So we take our computers with us. We just copy our shooting to the hard drives and then do another shooting next data. After the shooting is done, we login the data, naming and saving it, so that the editor could find it. We hire freelancers for the shooting or editing.

When we are shooting in our own locations, basically we used to have 1 or 2 Gb hard disk kept with us, and we used to travel, we transferred the files instantly and the moment one shot done, we copied it on the Lacie HD hard disk. This is particularly for the data management. Basically we were shooting with the 4k camera, but the sound, because it is not synced, the sound would come later in the postproduction. So the sound file would be separate and the video file would be separate. Then another guy, who was specially assigned the data management role, would copy the files and keep them in the backup database. After these days shooting we used to send the disks to a company doing postproduction. Then they would store the data and they would have a contract, where they would store the data for 365 days, and they charged us certain sum, the sound and the video, and the dubbing was done later in the sound recording studio and then sent to the postproduction studio again, and the studio took entire responsibility, that the data does not get leaked. The post production company then made its own backup in their own server that they had, in the server room, where they store a lot of data, which is copyright and encrypted, so it cannot be damaged. The entire process was too cumbersome, and also the cost factor, maintaining two hard disks of high quality and having them exclusively for that film. Because you can erase the data only after the movie is completely ready for its release. So data exchange was one of the main issues.

> We store most of our data on the hard drive, we don't have a central server to store data on, mostly because there so few of us and not all of us are working on the same file, so the editors have their hard drives they work off, but there is not so much of a need for a server to share information through. So the workflow is usually "your files are your own", and if you need to pass it on to someone, it's Dropbox or hard drive to transfer. The format is usually 2k, but that only the editors use, we do have 4k files, but they are downgraded to HD for everyday use.

Thus, although some needs for the centralized storage for the footage articulated, the main practice is to outsource main data management to the post production company, at least in cases of smaller production houses. And the main problem identified is data loss:

> Still you always have the danger of disk crashing, which does not have any solution. And if it does, reshooting that is practically impossible.

> Because storing things on a hard drive beyond a certain point is inconvenient, because it occupies the space and is not used, so there definitely is a way for more convenient storing all information. And the hard drives are not the best option, because even without use they degrade, and the information gets lost. So definitely the hard drives are not the most practical thing, if you want to store information long-term and if you want to go back and reference it, because there is always a hassle of looking through all the hard drives to find needed data. It is a feature film, so there is usually 1 or 2 hard drives which is usually 1 or 2 terabytes. So finding old shots gets tedious and inconvenient.

Data management, tightly tied to overall workflow organization, was considered to be not as well organized, as evidenced from different interviewees:

> Poor data management organization even regarding the Google sheets and other newer technologies. That was old production house, with quite a lot outdated technologies. I am sure there are some technologies, enabling better data management, because at the production house I've been working I did see a lot of things getting messed up, because people did not keep track of things and there were times when files were missing and the whole scenes had to be reshot, and that takes a lot of effort. People were not very keen with technology and also did not know how to keep track of things. So it's not just enough to have those hard drives, you need to know what to keep where. When it comes to postproduction, I am sure that they integrate and keep everything to one place, but I

> think that is something that should be done at the very beginning, so to start maintaining things at one place, so not to lose track of files, misplace them or loose. I think the backup on a daily basis to the one central location would be useful. I think the problem does not get solved because they don't know that it can be done that way. So I also think it is lack of experience when it comes to that.

However, some production companies manage to keep track of the information, but still via quite tedious solutions, such as keeping the manually updated log sheet and etc.

The data needs identified were large even for low volumes for production, so starting 30 minutes footage, the documentary production house already had to procure 100Gb for this footage, and "because the computers get too hot and cannot manage this volume, we tend to edit on external hard-drives only. Plus when we start the project we put the project in the hard drive, and it goes up to 700 Gb or something. We tend to keep our files for ever, to buy new hard drives." And the data needs were estimated to grow by all the respondents, due to their own growth anticipation. Solution for these growing needs is seen differently:

> Once you start with small films and you move to bigger films, you start to use more storage capacity and you buy larger hard disks for that, I am not sure what to call them, but they have huge storage capacity, like 100 Tb or something like this.
>
> and
>
> The company I worked for in New York had a corporate account via Dropbox. And you were granted the access to the files you were working on, everything was very organized. One centralized online storage is really necessary for the company, in terms of communication and working on files, especially when you there is a lot going on. The new york company did not do a lot of editing, it was outsourced, so the main storage was Dropbox.

Usually when the movie is finished, there are two copies, one copy is with the editor, and another is kept with the director. So to make sure that the movie does not get ripped, they make sure that there are only few copies available, in most cases one final copy with director and 1 backup with the editor. For national releases they need to send the copy first to the Censor board.

Communication insights

For better understanding the communication paths, as well as in the larger enterprise and telecommunications companies, it is necessary to understand how the procurement is done in these companies. Some insights regarding that have been given:

So I think storage is bought separately for every department. Whichever department they come from, they give the requirements to the production house and production house makes sure that they have this requirements handy at the time of production. So the production house procures the cameras for the cameraman, so similar goes for the storage. When it comes to the production department, then they have different production managers, production controller, who handles equipment as well, and keeps in touch with the agencies, equipment dealers. So they get in touch with hundreds of such agencies and then choose the best price.

If the studio I work in will decide to expand their storage infrastructure they might ask the IT service provider, that's probably the most likely way for them to do it. We don't have one contracted IT service provider, but we do have people coming on need-by-need basis. We don't have like in-house IT person though.

Here the department denotes also all the freelance specialists and contractor working with the production company. In another example, the IT services are also done on the contracting basis, and the storage solution advice, if comes, will be taken from that party.

So the smaller filmmaking studious are the ones which usually still have moderately low needs in high-performance data storage, however some irregularities in their workflow make them think about scaling and expanding their storage facilities. The decision on the storage used is made in-house, meaning that the director of the studio is likely to search online, via the web, or ask colleagues, how is it done, so employing personal word-of-mouth. One of the respondents made the comparison of the available infrastructure in IT-solutions in India and in the US, noting absence of tailored solutions for media industry in various contexts. So communication to these organizations would definitely involve some sort of education about more advanced storage systems that direct-attached storage, currently used. Some of the filmmaking companies therefore do all of their data management in-house, although either in hard-drives or in more sophisticated self-built storage infrastructures, which are still very basic, and some of them collaborate with the large production houses, which supply the filmmaking company with all the services about film commercialization but also some technical equipment such as cameras for shooting the films. These production houses, as they are larger and data volumes are respectively higher, already have some IT departments within, which deal with the procurement of the IT systems, and function more or less similarly to the buying center of the large enterprise, as one of the interviewees noted:

Some production houses may have IT specialists inside, but are more likely to outsource IT know-hows. When it comes to mega production houses, they have large IT

departments. That depends on the workflow and production intensity. To find the outsourced solution they use paid services, like consultancy.

and

A larger company would probably have a more streamlined workflow, people have many functions in a small company. The larger production houses have a lot of departments they can delegate the work to, and they are larger, so everything is a little more broken down, in the case with us it is few people doing large things.

3.3.4. Postproduction companies

Market overview From the multiple sources, such as the interviews with the postproduction studios interviews and the interviews with the production studios' representatives, the postproduction studios were portrayed as being most likely the early evangelists, if approached properly, as they have heavy loads of data, and often they deal with data management of the filmmaking studios, they understand they have these problem and set up the "archiving" or "server" rooms, as mentioned by the filmmaking respondents and the postproduction studios representatives, they have their interim solutions and are committing budgets to solve the problem, and that leaves the only criterion of active search and timetable to find the solution unsatisfied (Blank, 2013, p.30).

The postproduction industry is tightly tied with the filmmaking, as well as the technical advances and needs. So already in 2004 the first Indian post-production studio was set up in Mumbai, Rajtaru Videosonic, having partnered from the very beginning with Seagate hard disks, dealing with high volumes of data by the time (Infotech Indiatimes, 2004). Due to the high quality to cost ratio, since the 2000s the global filmmaking industry is involving the India visual effects and postproduction companies into computer graphic production for the movies (Bentsen, 2000), with ongoing rise of the Mumbai, Chennai, Bangalore and Hydebarad as postproduction, animation, visual editing sites for Hollywood movies as well (Deloitte Touche Tohmatsu India Pvt. Ltd., 2014). There are also international players in the industry, such as BKS or similar, also offering the storage services among all others.

Articulated needs

The evidence about the needs is extracted from the 2 small interviews with the postproduction companies interviewees and some insights with the filmmaking companies' representatives interviews. Both companies specialize at film postproduction, one of them also specializing at the game audio provision. So the common workflow for these companies involves the shots editing and video effect adding, as well as audio production and dubbing the movies. The systems used in the organizations named were the Apple systems and the external hard

drives, organized in a network-attached storage. “Right now we use LAN to access within the systems we have. We can use ISDN to connect across the globe and access the software in sync” – as told one of the interviewees.

Larger postproduction studios work with storage providers also locally, as in the example of the corporate case study of the Tyrone Systems setting up a unified storage solution for a production and postproduction studio from Hydebarad, who sought high performance and scalability, high sustained bandwidth and user-friendly interface and simple infrastructure integration, delivered through custom built NAS storage infrastructure (Tyronesystems, 2012).

Common practice is to delete the files of the project after its release, also due to the constrained storage space: “We store until the feature or the video is released. Mov formats takes 35-40 gb for a movie. Project files depends on the software we use. But for space consumption we keep the project and delete the videos after it gets released.” Another solution is buying more new hardware storage, which was considered as an option for the larger postproduction studio.

The important needs were in organizing the secure and encrypted storage, as well as comfortable solutions for editing from multiple computers, supporting the concurrency of access to the stored files, also rendering of the processed image. The smaller postproduction company reacted positively to the “idea to keep a video in one storage machine and many people can access it at the same time, but it depends on other technical aspects to support it.”, and emphasized that “Working on the same file by different users will make my video struck.” Postproduction houses organize data: they usually have one central server that delegates the files through every computer that is linked to it.

Important factors for storage were the cost and accessibility, with larger postproduction company using the Raid system and mirror system, duplicating the files which are worked on and the ones that are rendered, also making the work of the editors parallel. “Ideally 5-10 duplicated discs would be enough for our work, keep in mind that we have around 50 computers”.

The volumes of work are also expected to grow, due to the growth in the number of projects to work on and also technology developments, such as 2k, 4k, even 6 k, which are not yet that widespread in India also due to the infrastructure restrictions.

> For visual effects we need volume and mirroring system. And it would be better to split into types, and better even in different networks, because we are using one network with render-farms, and if we had two different networks, it would be even faster. The concurrent access is always an issue. Also the storage place and limited opportunities to access the same spot on the raid, the power is rising, calculations’ amount, data streams rise as well. Buying more technologies, having access to the information cluster does

not solve the issue, but automatically leads to a problem in the system. And the third problem is the processor's power.

Communication insights

For the postproduction companies the need in proper data management and storage is more acute, however the available interviewees in this sector were mainly small-to-medium size organizations, which do not have IT-functions in-house, meaning that they consult an external party to set up more or less complex networks or storage systems, evaluating their offerings mainly based on the cost-to-quality of provided services, as described by these intermediaries. The communication channels emphasized in finding these outsourcing services also involve web search and personal word-of-mouth. Also were identified some preferred communication channels for post installation phase and client support, very common for India B2B marketing in general: phone and e-mail.

So the smaller postproduction company did not choose the current storage system they have for too long, and identified web search as the main way to find one. Both companies update their storage facilities mainly once they are outdated, or run out of space, although expensive, and the software defined solutions enhancing the performance are also sought. As example not from the respondents, there are some software-defined storage solutions developed in India, such as NetMagic (NetMagic, 2014) or Indiqus (Indiqus, 2014), along with global players such as VmWare, HP or Dell, however they do not seem to be specifically tailored to the needs of the media industry, potentially allowing Raidix to specialize on this niche.

3.3.5. TV broadcasting company

Market overview

One of the most important highlights of the India TV market for a storage solution provider is ongoing total digitization of the content, also demanded and supported by the Indian government, which, together with greater broadband, internet access and cable digitization is expected to drive the demand for the digital content. (Deloitte Touche Tohmatsu India Pvt. Ltd., 2014).

Articulated needs.

The TV broadcasting company highlighted the outlined above need in the reliable streaming and broadcasting, but also storing and archiving, respectively, high volumes of data transferred and recent transferring to the only digital formats, having storage system integrated into general infrastructure, including data management and connectivity systems:

> We have a storage we call it DAM – digital asset management, and since we are into production, we have really high quality of the video. And we store them on a solution called Isilon (EMC). So we have our set archive format, and we have a production, which would do it on a high-quality resolution of the video. So once we have the production complete, that is what is called a transmission file, that comes in a format called wrapper mxf, which has IMX 50 quality, and this content we have using the CSM storage management, and this is stored on these Isilon servers, and this Isilon is for the archive using DIVA solution, and so later on this content we are archiving it through IBM library, which has an LTO cartridge. So we are using LTO6. So this is our archiver storage media, and whenever we need to retrieve it back, so we use the same tool coming through DIVA, and then it is sent to the transmission service. The speed we are using DIX speed CISCO routers, and the minimum speed is the Ethernet cable is out, is 20 Gb. And we use the router switches, these routers are using Fiber connectivity, so we are using multimode fiber connectivity, because it is much faster and carries high bandwidth.

The company, having been doing ingesting right from the beginning, started with the tape and when the HD channels were launched, they chose the format where they "found the overall picture quality to be fine in the compression". For that standard they chose IMX 30, and for high definition - IMX 50. Whereas for the capturing part they chose the AVS-Intra solutions (Panasonic format).

> We added this, since we started from this file format, which was the digital form, first we went on adding a license to these drivers, and the only thing we went on expanding was the archiving, that is the storage part. We already had a storage and we decided to add EMC, because you need a license to handle more archival content and store it, so we had the solution and we had a license to it. And time-to-time it was upgraded. We started in 2008, when we launched our high-definition channels. And all the latency content has been transferred to the digital domain.

Aside from the licensing the content and corresponding requirements for the storage, there are also demands put by heavy data workload and constantly working technical infrastructure:

> in order to be sufficient to take care the lead tomorrow, because they are working 24/7, so we have the limits as to IT standards and we keep on changing the hardware with the more efficient and multipurpose service. So that we keep on upgrading. We keep on updating the hardware, when we need to expand it, otherwise there can be errors.

Because there is no support after the 5 years, so the hardware becomes obsolete. And after every 3-4 years there is new hardware in the market.

Also, as the other media industry players, broadcasting companies meet the ongoing demands on rising quality and therefore volume of the data, such as high-quality content, 4k resolution and similar, which needs to be accounted for, "because 4k will acquire more space at archival". Thus, with growing storage needs, the buying cycle starts quite often:

Whenever we have a new project, we look into finding the best available resources in the market, in the hardware, with better cost, then which is more stable, which can have more capacity. Earlier we had a server for the storage, and it used to take huge storage space. Now Isilon, IBM, HP have come up with the blade storage, where you can stack up all harddiscs in one frame and acquire more storage media. The processor and processes become more powerful.

Communication insights

The TV broadcasting company has functioning technical specialists, for instance, broadcasting managers, who both regulate the streaming, broadcasting process and take the decisions on the procurement for these activities, as they perform the central function for the company's business and possess the necessary expertise for decision-making. They are rational buyers, who consciously assess all the storage solutions in the market, visit the tradeshows and specialized industrial conferences, such as Broadcast India Show and similar

There are time-to-time broadcast exhibitions and conferences, all across the globe, but recently which is over is the NAB in the US. And from our R&D team and from our IT team broadcasting people visit these exhibitions and ensure that these new technologies have been taken care of.

The buying cycle, similarly to the large enterprises, starts at carefully choosing the necessary solution, trying, relying on the personal WOM and technologies standardly used in the industry,

we went through many checks and observations, we did not select directly, we went on trying various archiving and storage media. And looking around, what others are using.We have completed more than 20 attempts of transmission, and we have seen right from the beginning, that Techtronic was the only solution available on the hard disc, and they were first to come with the LMS solution. LMS is the library management system, they also came with the cartridges and those cartridges were very small storage solution they had. And we even tried those, and they were not so helpful, because all the time they were upgrading cartridges, and when they started it was 1Gb

and again few months they have upgraded to 10 Gb and so on. So nobody sticked to those solutions and they were not so helpful for us. And archiving it on hard discs was also not a good solution, because hard disc was also very expensive those days. So we found that tape is doing much better – during that time.

The passage above also indicates, that sometimes the company has to stay with old solutions, because even though the new technologies were attempted to be found, not always it is possible to find them. Regarding found solutions the company representative highlighted the need for constant after-sales service, ensuring the purchased solution works smoothly.

3.4. General communication recommendations

General adaptation of the web-site for the search in locally specific search engines, such as google.co.in, Guruji.com, Rediff.com, in.yahoo.com, khoj.com, with Google being one of the most popular search engines, especially given the wide spread of English language in the country and global character of the industry (Kennedy & Hauksson, 2012).

Information partnership with major information media and press in the respective filmmaking, telecommunications, tv and radio broadcasting industries, such as for instance the Broadcast India Show 2016 information partners, among them Satellite@ Internet India, online magazine about relevant for these industries events and news (http://www.satii.tv/aboutus.html). Another similar resource would be also Studio Systems (http://www.studio-systems.com), an online magazine, summarizing latest technology developments in India tv broadcasting and film postrproduction industries, also featuring a shortnote regarding the types of storage systems, addressed at the postproduction studios and their needs for centralized data workflow with account for their opportunities and needs, also featured in the web-site of the Raidix partner in India, Bytescale (Shah, 2006).

Other notion, specific for the B2B purchasing technology products, is that the buyer is in charge of finding the most information and that the solution supplier is not controlling the information the buyer gets, he can only provide with as much information he can, engaging in quality content marketing, and building online communities around that. The cross-functionality of buyers demands accounting for both business and technology specialists seeking the solution the other companies may provide. Also the social media may be used to track general engagement and rising influence on B2B purchasing, but in comparison to that mobile marketing can be used to deepen engagement with the company and product brand (Barnes, 2013).

Also content marketing is one of the most popular strategies in the B2B sector in India, helping to increase brand awareness and engage new audience via such instruments as blogs and

newsletters, social media, images and infographics, testimonials and case studies, as previously seen, used by Indian storage providers as well, videos and webinars, research reports and white papers, and the e-mail marketin being one of the most important instrument of customer communication, resulting in the highest ROI among other instruments: 95 Rs for 1 Rs invested (Octane Research, 2016).

Overall, regarding the case study propositions, outlined in the second chapter, it is necessary to note, that the company would truly need to employ mass communication for awareness-building, especially with the customers, needing the product education, and although it may seem that the small film making companies are the only category requiring such activities, in reality not much knowledge was revealed among all groups of the interviewees.

Next, the purchasing patterns of prospective customers, outlined per industries above, vary depending on the size of the company and respective presence or absence of inner IT department, as when it is present, the cross-functional buying center is present, meaning opportunity to communicate both to business and technology departments of the company, and when it is absent, similar cross-functional cooperation occurs with external service providers, with which Raidix could partner to ensure smooth cooperation with the end-users. Although the opportunity to engage with end-users directly is explored in the communication framework built in the next section.

3.5. Market Readiness Levels of the product for the customer groups

The market readiness level is estimated for 6 groups separately, as the company's offering and its product readiness are different for all the cases. A note should be made, that although the company already sells its products vi various means, India is a new market and therefore the product offering for the customer groups is evaluated separately, although for instance the description of the product, specifically tailored for the industry or organization type (production, postproduction or broadcasters) allows to infer greater product readiness, for instance.

The small filmmaking companies compose the Demand Readiness of 8, as the adapted answer to the expressed needs (which is DRL9) is almost built by the company, the technological standards are similar, and the product is developed, but still the company has not entered the market yet to really develop the adapted "answer to the expressed need in the market" (Paun, 2011). The Customer Readiness Level is 2, as even though some needs seem to be confirmed, this demand is still latent. As it is still early time to entry, the Product Readiness Level is at the level 2, where the market segmentation occurs, competing products, at least global players, are already analyzed, and the lead users are being identified, in case of the filmmaking

industry that definitely would be Bollywood, as mentioned in the company's interviews, which is partially supported by the evidence of still suboptimal industry infrastructure development by one of the respondents. The Market Readiness level, measured individually, is about 7, in the Competitor analysis and positioning globally and regionally. Altogether that is Market Readiness Level of 4.

The postproduction studios have similar DRL of 8, CRL of 4, meaning the confirmed needs of the customers in the interviews, PRL of 3, and MRL of 7, the total MRL score, as average of the previous measures, is 5.

For the TV-broadcasting companies – same DRL, CRL of 4, PRL of 3, MRL of 7, total – 5.

For the telecom companies – DRL is 5, meaning that it is known, what is the Raidix solution capable of, but no translation into response for the telecom had been done yet, MRL 4, meaning the market research is still needed, CRL is 2 for Indian market yet, PRL is 1, as it is a new market globally, altogether arriving at MRL = 3.

And for large enterprises it is less adapted, having MRL at 1, DRL at 1, CRL at 1, and PRL at 1, altogether arriving at MRL 1, meaning, that this segment is not targeted currently.

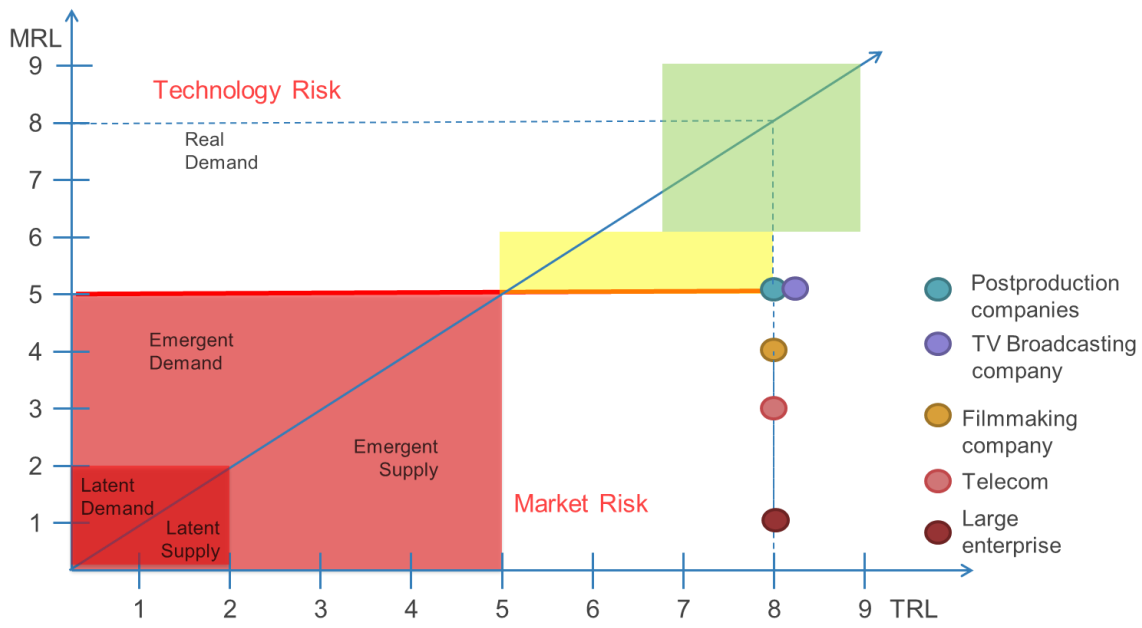
3.6. Technology Readiness Level of the product for the customer groups

The Technology Readiness Level, is estimated via the average of the sum of the Technology Readiness Level, Integration Readiness Level, Manufacturing Readiness Level and Intellectual Property Readiness Level. Estimation of most of these is heavily influenced by the fact that the product is already marketed internationally and domestically, meaning the maximum Readiness Levels for most parameters.

The Technology Readiness Level for the software-defined storage is 9, where the technology already gets the market and sales certification. *The Integration Readiness Level* is also 9, meaning that the integration of all necessary components is proven via successful product usage in the storage infrastructures of the company's clients and in the turnkey solutions of the distribution partners. *The Intellectual Property Readiness* is between 8 and 9 as it is unclear, whether the existing patents are in force in India. The *Manufacturing Readiness Level*, according to the 1-10 scale is also the maximum, 10, meaning that the company is able to produce the solution in a relevant environment, integrate it with partnering solutions, and has lean production practices in place to ensure quality and effective production and integration.

3.7. Building the customer-centered communication framework

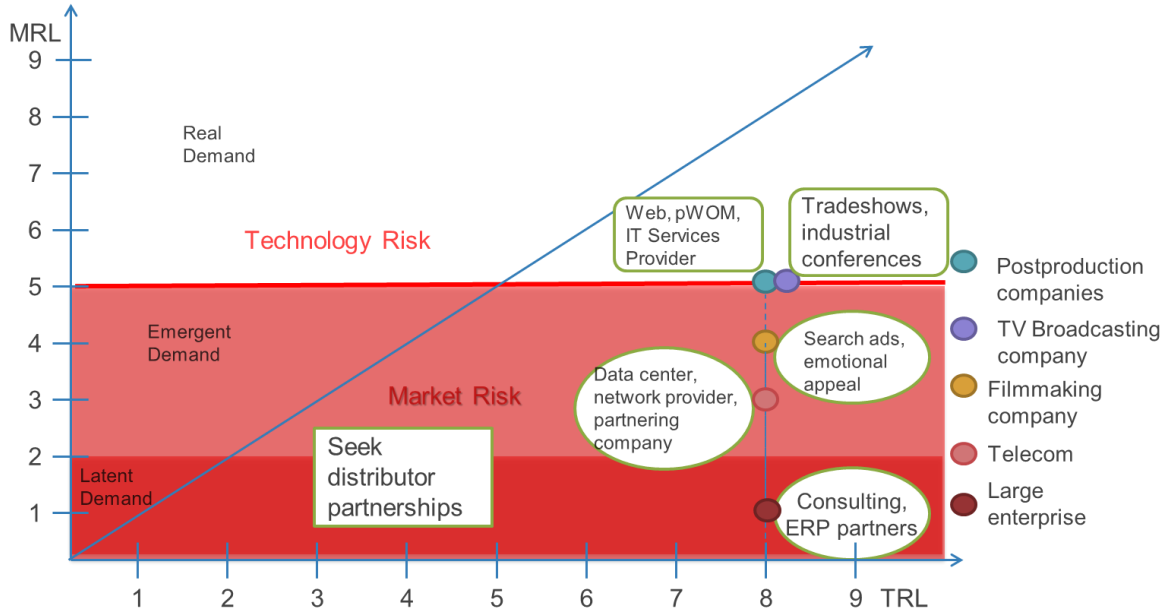
Integrating the Technology Readiness Level with each of the Market Readiness Levels, according to the Marketing Testbed methodology we are getting the following figure:



Where all customer groups except for the TV broadcasting companies and postproduction studios are located in the emergent demand area (below MRL5). Emergent demand sometimes provides opportunities to identify and target lead users, and for filmmaking companies that would be Bollywood and large film production houses, or the postproduction companies working with these filmmakers. However, according to the marketing testbed approach, the Market risk to engage into serving customer segments with MRL lower than 5 imposes higher market risk, due to only emerging demand, where 3 alternatives exist: either the company finds the lead users, or they enhance their product readiness and explore better the customer and the market to build more adapted response for Indian large enterprises, telecom companies, or small filmmaking companies, or, in case of immediate market entry, they should find downstream partners, who possess the communication channels, allowing to connect to these customers. And the communication channels are outlined by the customers themselves, so for large enterprise that would be finding connections with consulting and research companies, or the IT infrastructure partners of the company, who provide it with integrated solutions, storage also. For telecommunication companies that could be leveraging the clients network for market entry, as the company has large telecommunication company as a partner in the home market (Razumny, 2016), or working with data centers and network providers for the telecommunication companies, which may outsource these functions. For filmmaking companies, given the explicit need of market education for these companies regarding the storage services, and still quite high market risk, it would be advisable to also wind a downstream sales partner. Regarding the two other categories, postproduction and TV Broadcasting companies, the company may still consider engaging into partnerships, however it also may communicate to these companies directly via outlined communication channels,

although while tradeshows and industrial conferences is a wide-used practice, connecting to the postproduction studios may be difficult due to the purchasing behaviour of such companies, which are likely to buy the storage solutions as a turnkey project from the exterior IT services company, however also are competent enough to seek the solutions on their own via web search and personal word-of-mouth.

This allows to reformulate existing framework of the marketing testbed assessment of the market and technology risks to entry and arrive to the framework, depicted below:



So general recommendation would be to hold to distributor downstream partnerships in case of the customer and market development being at the level of 5 and lower according to the MRL scale. This is a normal practice for the born globals and modern IT enterprises as well, when building the wide network of partnerships, mainly downstream, and the upstream, which is more related to the knowledge transfer and new product development. The specificitites of the certain MRL levels would allow to suggest even the types of the downstream partnerships, as according to Ries (2011) to engage into: for instance, the MRL 1, where the customer needs are only being identified, it is reasonable to address the system integrator, who would identify the users need and tailor the developed solution. Similarly, the work with the Solution provider can be started as early as at the MRL1 level, because they offer service based on the self-defined user needs (Ries, 2011). Then, from the MRL levels 4-5 it is possible to work with value added resellers, similar to Bytescale, who would provide configured, integrated, turn-key solutions. The less engaged into customer relationships and product tailoring partnerships, such as volume distributor, licensing, or retailer, or independent software vendors would be useful at the MRL levels higher than 8, because they would need clear positioning from the Raidix products already at hand to sell them along with the other products. And the influencers and consultants can be

useful throughout the MRL scale, helping the company either to capture the lead user attention, or convince later adoption groups as well, although there the personal word-of-mouth becomes more important, as the later adoption groups are more risk averse and look for similar need solution among their colleagues and etc (as seen in the example of the large enterprises, for example). For the partnerships below MRL5 the joint sence-making becomes especially important to transfer the vision and mission of the product properly to the market (Pesch, et al. 2016).

Another mechanism to enter the market, as already emphasized above, would be following the client strategy, as most of the targeted industries have international players, or one large player may aid in the foreign markets entry via advice to other industry players, the mechanism that works for the large enterprises when procuring for various technologies, so Raidix could leverage for this instance the Rostelecom connection, or HP partnership, as HP is present in the Indian storage market, or via partnerships with international postproduction studios, or production studios as well, as foreign production studios are shooting more films in India and this process will continued, supported by the government single window clearance measures (Deloitte Touche Tohmatsu India Pvt. Ltd., 2014).

Some of the components of the communication strategy, such as content marketing, e-mail marketing, web-site online advertising are not mentioned as for some of them, such as e-mail marketing or online advertising, the customer does not have an active role, and for those like content marketing and search optimization the embedding communication channel would be self-independent web-search.

3.8. Summary of chapter 3.

1. The empirical research resulted in 11 respondents and 5 customer groups, based on the common anticipated needs and data storage usage patterns: large enterprises, telecommunication companies, filmmaking companies, postproduction companies and TV broadcasting companies. All of them have large data storage capacity needs, however also affected by the workflow: extra security and established brand of any particular partner for the large enterprises, opportunity to contact the telecommunication companies through their datacenter subsidiaries, although populous with local competition, necessity of customer education and emergent demand in case of small filmmaking companies, and, as implied, an established need for the larger production houses, then an established need with existing around this need market for the postproduction companies, and similar case with the TV broadcasting company, adding also strict content licensing requirements.

2. Thus the propositions of the case study have been confirmed, so for initial awareness building mass media communication channels are appropriate, although due to the product complexity and varying market readiness levels – also not sufficient, as the lead users determination and partnering is necessary.

3. The advisory communication framework is built, which involves the procedure of company's product readiness assessment for the market via technology and market readiness levels, ranking the communication opportunities starting with the lowest market risk, estimated as the distance from the desired technology management line, and, if the market readiness level is 5 and lower, engaging into partnership beyond the company's main inclination to partner is advised, as this market readiness level identifies that the market strategy still needs to be developed via more customer, competitor, market research, value proposition and business model creation (MRL 6-10).

4. Another factor, contributing to the recommendation to partner downstream for Raidix company is its status as a Born-global company and existing network of partnerships, constituted of mainly global players, which, especially given such an open to the foreign presence market, would be beneficial for the "following the client" strategy.

4. DISCUSSION AND CONCLUSIONS

4.1 Discussion of the findings

The research question of the work was how a hi-tech company may choose appropriate communication practices for the certain customer groups during market entry? How does technology readiness level and market readiness level affect the communication channels to be used? The research gap was identified in hi-tech company communication to prospective customers, linked to the market entry, the result of this study will propose a framework for hi-tech companies structuring their communication policy to prospective customers during market entry. The research was organized as an exploratory case study of one software-defined storage provider intending to enter new markets, in particular, the Indian media and entertainment market. The data was collected via semi-structured problem-oriented interviews with company' representatives and their prospective customers. Data is company's insights about the technology readiness level of their product, customer insights about their needs in relation to the case company's products and about communication channels via which they could be reached.

The empirical research resulted in 11 respondents and 5 customer groups, based on the common anticipated needs and data storage usage patterns: large enterprises, telecommunication companies, filmmaking companies, postproduction companies and TV broadcasting companies. All of them have large data storage capacity needs, however also affected by the workflow: extra security and established brand of any particular partner for the large enterprises, opportunity to contact the telecommunication companies through their datacenter subsidiaries, although populous with local competition, necessity of customer education and emergent demand in case of small filmmaking companies, and, as implied, an established need for the larger production houses, then an established need with existing around this need market for the postproduction companies, and similar case with the TV broadcasting company, adding also strict content licensing requirements.

The study propositions have been confirmed and together with the Marketing testbed and Customer development methodology allowed to arrive at conceptual communication framework, allowing the hi-tech companies to structure their communicating policies when entering the market, accounting for the current market and technology readiness level of the offering and the downstream partnerships opportunities. Thus, for initial awareness building mass media communication channels were considered appropriate, although due to the product complexity and varying market readiness levels – also not sufficient, as the lead users

determination and partnering is necessary, and different purchasing structures were established among potential end-users of the Raidix solution.

The advisory communication framework is built, which involves the procedure of company's product readiness assessment for the market via technology and market readiness levels, ranking the communication opportunities starting with the lowest market risk, estimated as the distance from the desired technology management line, and, if the market readiness level is 5 and lower, engaging into partnership beyond the company's main inclination to partner is advised, as this market readiness level identifies that the market strategy still needs to be developed via more customer, competitor, market research, value proposition and business model creation (MRL 6-10). Another factor, contributing to the recommendation to partner downstream for Raidix company is its status as a Born-global company and existing network of partnerships, constituted of mainly global players, which, especially given such an open to the foreign presence market, would be beneficial for the "following the client" strategy.

4.2 Theoretical implications

The study contributes to the newly developing theory of Marketing Testbeds and the research of customer-centered communication practices for the hi-tech companies during their market entry. This is done via analysis of a single case study of a software-defined storage expanding to Indian Media and Entertainment market, also capturing insights from potential enterprise customers of the company.

The implications of the current research allow to integrate existing knowledge embedded into the Marketing Testbed methodology and downstream and potentially upstream partnerships, although the latter were out of the scope of his research, available for the software companies during various stages of their operations. The research also emphasizes the need for properly structured cross-functional communication with cross-functional buying centers of larger B2B clients and entities and suggests a more subsequent and networking approach towards end-users, having mediators between them and the potential solution vendor, along as the various ways of usage the direct and indirect communication instruments during market entry.

4.3 Managerial implications

Along with the theoretical development of the Marketing Testbed approach, the current study is suggested to be offering a practical framework for structuring the communication policies for hi-tech software companies during market-entry, accounting for such factors as

1) technology readiness of the offered solution;

2) market readiness of the solution for identified prospective customers;

3) clear guidelines how to avoid market or technology risks via following the balance of market and technology development, avoiding market and technology risks;

4) opportunity to mitigate the risks via employing the customer development approach in structuring the communication policy;

5) opportunity to thoughtfully choose the downstream partnerships, according to the existing network of partnerships the company, in this case being a born global and knowledge intensive internationalizer, and according to the levels of risks, subsequently mitigated by the types of partnerships proposed.

4.4. Limitations of the study.

As the current study is done in the methodological form of the case study, the essential issue is the ability to generalize the findings and to apply them to other companies, operating in the similar sectors and oursuing similar internationalization strategies. Up to some point the generalization is provided with the Marketing Testbed approach usage, which has been constructed via numerous tests of the hi-tech products launch, uses established methodology of the technology anf market readiness levels and their interaction.

Still, more cases employed would bring more validity to the study and opportunity for that might be provided via usage of the case study protocol, provided in the appendix of the current work.

Another two limitations concern the chosen industry, the data storage, which is quite a narrow segment of the software industry, and the countries and markets of origin of the investigated company and the country of the market entry, which gives us the focus of the company from one developing market entering to another, while the conditions regarding communication practices and partnerships opportunities could be different in the developed markets.

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Appendices.

Appendix 1. Technology and Market Readiness Levels. Source: Hasenauer et al. (2015)

Level	Technology Readiness	Level	Market Readiness
1	Fundamental Research	1	Unsatisfied needs identified
2	Applied Research	2	Potential business opportunities Identification
3	Research to prove feasibility	3	System and general environment Analysis
4	Laboratory Demonstration	4	Market Research
5	Technology Development	5	Target Definition
6	Industrial Prototype	6	Industry Analysis
7	Product Industrialization	7	Competitors Analysis and Positioning
8	Whole system field Demonstration	8	Value proposition Definition
9	Market / sales Certification	9	Product/service Definition, coherent Definition of Business Model

Appendix 2

Case study protocol (based on the Yin, 2003)

1. Introduction to the case study and purpose of protocol

A1. Questions and propositions:

Research question: how can hi-tech companies, while orienting on their customers segments and their declared preferred communication channels, communicate their product message to prospective customers during market entry?

Propositions:

- Unfamiliarity of the product or company in the market suggests using mass communication techniques, such as press relations, publicity or sponsorship, as these are the communication techniques, aimed at building knowledge about the company, whereas building attitudes or fighting negative attitudes is better with personal communication, and influencing the purchasing or cooperating behavior occurs via personal communications techniques, such as events and direct communication
- Product complexity level influences customer communication preferences
- End-users and buyers/payers exhibit different preferences for being communicated by the company.

A2. Theoretical framework of the study

Marketing testbed approach (Hasenauer et al., 2015) and Customer Development Model (Blank S.G., 2006) and Demand Readiness combined with Market Readiness

levels by Paun (2012) together with studies on message communication to the hi-tech product customer, including the partnership strategies, as summarized by Rose (2015) for software companies.

A3. Role of protocol in guiding case study:

Allows replicate findings in other companies and markets contexts, standardizes current research inquiry.

2. Data collection procedures

   B1. Names of sites to be visited, including contact persons

   Undisclosable due to promised confidentiality to the interviewees, especially on the prospective customer side. Own researcher's network and snowball effect were employed, along with standardized research inquiry into professional communities of interest.

   B2. Data collection plan.

   The time period used for data collection for each case study is 4 months, where 1st month is theoretical establishment of sampling criterias, adaptation of the interviewing questions, assessment of the company's product and offering according to the market and technology readiness levels, next 3 months are devoted to data gathering, scheduling and conducting the interviews.

   B3. Expected preparation to site visits.

   Review of the questionnaire and company product information via provided documents by the company, review of the interviewee information and industry, review of the communication channels available to hi-tech marketers.

3. Outline of the case study report.

   C1. Technology Readiness assessment of the company's product.

   C2. Customers' grouping and classification based on the attitudes towards the company's product.

   C3. Market Readiness, Perceived usefulness and Perceived Ease of Use estimation using the customers' interviews insights

   C4. Communication insights extracted from the interview.

   C5. Integration of the company position in the TRL-MRL coordinates and communication channels to be used.

4. Case study questions.

What is the Technology Readiness Level of the product? Level 2 – individual case question

What are customers' attitudes towards the product? How do they estimate usefulness or easiness of use? Would they use it or agree to buy? – Level 1 questions, asked to specific interviewees

How can the various customers' groups be formed based on the product attitudes? – Level 2 question

What are suitable communication channels and ways to communicate? – Level 4 question, requiring information beyond case study evidence, including secondary literature

What is the estimated Market Readiness level? – Level 2 question

What is the interplay between the product MRL-TRL positioning and the communication channels proposed by the customers or relevant secondary literature? – Level 5 question – normative question, requiring generalization beyond this case study scope

Appendix 3. Sample interview guidelines for Raidix case interviewees

Interview Questions

Thank you already in advance for participating in this research concerning data storage appliances!
Your answers are dealt confidentially.

Respondent profile

Number of employees:

Industry:

What is common workflow at your company?

Data storage usage:

What are primary needs of your organization in the data storage?

How do you store data (Network Attached Storage, Storage area Network, or DAS)? What kinds of files/data do you store (digital, 2K, 4K)? How big are they and how important to your business?

For how long do you store files (long-term, or archive after the project is done)? How many gigabytes of data do you have stored? Will you need more storage space in the future?

Do you need to stream files? Do you need to access them for editing and post-production work? How many users need to have access to the same project kept on the storage unit? What do they do: read files, write on the storage, etc.? How often do they access stored files? What kind of in/out performance do you need from your storage solutions (input/output operations per second, etc.)? Why?
Do you need special features of the storage for shooting, storing and accessing the footage?
What are your requirements for the storage performance (which speed do you prefer, GB/s? How many concurrent streams of data at what resolution?

Possible supporting questions:
Can you describe your storage infrastructure? Do you use commodity hardware or high-end arrays? What RAID levels? Any JBODs? Other? Do you have SSD - solid-state drives? If so,

how many in terms of gigabytes? Is all your storage onsite? Which applications work with your storage?
Can you describe your hardware by make, model, number of units, and number of drives?
What kind of connections (protocols and speeds) link the storage devices and work stations together?

Current needs in storing data:

Do you have any problems that you need to solve or that hinder your workflow (data transfer too slow, hard to work simultaneously on same files, or other)? How much would you value their solution (economy of working hours, etc.)?
Possible supporting questions:
Do you need/Does your company need:
- to scale your storage environment?
- to expand your environment affordably?

- to scale out your storage beyond what hardware-based controllers could support?

- enhanced data protection?
- to avoid silent data corruption?
- to optimize the performance of your storage appliances?
- to increase availability?

Communication channels:

Did you/your company consider other storage software solutions? How did you find them?
Did you search via Web (/ask your friends, colleagues/visit some exhibitions, venues, tradeshows? If you don't have a storage software solution, how would you search for it?
Did you buy a turnkey project (for example, together with system administration services from one provider)? How did you find and choose the company that chose the storage system for you?
When would you consider changing all storage appliances (hardware and/or software)?
How would you prefer to receive relevant information from the storage software solutions company about special features, new offers, etc.?

Prospective research:

Could you recommend anyone else to conduct interview with?

Thank you a lot for your answers!