MASTER THESIS

Lean Internationalization of High-Tech Startups

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Abstract

Most startups do not survive for very long after they are founded, therefore the issue that must be answered is, "Which variables account for a company's failure, and most critically, how can a startup prevent that?" One of the most prominent techniques for countering early failures is the lean startup methodology (Ries, 2011), which places a high priority on customer demands and fast iterations. Lean startup gained traction as a pivotal concept for business practice and product management among the academia and entrepreneurial institutions. Despite its critical acclaim, the lean startup approach has received scant attention in the domain of internationalization, particularly in the field of internationalization accomplishment. In terms of profitability and expansion for international businesses, internationalization has become imperative. Presently, internationalization is perhaps one of the most significant elements in a company's operation. Particularly for startups, thinking globally is a key-rule in starting new businesses nowadays. While many startups know that global thinking and international expansion are necessary conditions to meet, the underpinning actions needed are not always evident. Moreover, while internationalization is critical to business enterprises, it is largely unknown how startups are cultivating processes of quick and lean entry into foreign markets (Thi Thu Phuong, 2019). Prior studies have systematically studied the born global (Cavusgil & Knight, 2014) and international new venture manifestations (Oviatt & McDougall, 1994), the associated field of new technology-based or high-tech ventures and the amalgamation of internationalizations effects have remained untouched, leading to an investigation to fill this void in international business and lean startup literature (Kiederich, 2007). Therefore, the aim of this study was focused on understanding these research strands and also to investigate how the various dimensions of the lean startup methodology affects internationalization's success of high-tech ventures by providing empirical evidence on the following research question: What is the effect of lean startup methodology on the internationalization's success of new high-tech ventures? The absence of adequate secondary data sources on the applicability of Lean Startup Methodology, meant the acquisition of primary data via a survey instrument, with regards to the concretization and operationalization of the Lean Startups subconstructs. A quantitative methodology was therefore chosen to test the formulated theories and to draw generalizable conclusions regarding the influence of Lean Startup Methodology (LSM) on the internationalization success. In order to achieve this and also to analyze the adequacy of the LSM – internationalization implication, a type of observational study, more specifically, a cross-sectional survey design was chosen. With the means of a self-administered online survey, fifty-nine high-tech startups, geographically dispersed between North America, Europe and Asia participated in the study. Results that were different from what was anticipated surfaced. Through a moderated regression analysis of the data gathered on high-tech startups, the LSM - internationalization success (linear relationship) link was shown to be extremely robust and very significant. For analyzing the moderation effect, the associations of various uncertainties (market and technology) and inter-firm tie strength (domestic and international network) were regressed on the linear relationship. The conjecture, the higher the technology and market uncertainty, the better is the LSM-internationalization success implication did not hold true. It was hypothesized that, by adhering to the lean startup approach the entrepreneurs are much efficient in acquiring knowledge when uncertainty in the market and technology is high. To put it another way, with every increment in knowledge acquisition, the per unit cost drops. This was a false positive prediction. The circumstances of internationalization and the high-tech context lend itself to the presence of experiment creep, which manifests when an experiment lasts for prolonged periods and is thus costly. In previous research, inter-firm networks were found to have both positive and negative effects on early internationalizers (Coviello & Munro, 1997; Sepulveda & Gabrielsson, 2013), and this thesis builds on that work by embedding the LSM scope and assessing whether inter-firm networks are advantageous or not for the startups' overseas venture effectiveness. According to some studies, stronger ties to inter-firm

networks may impede the internationalization of startups because they disrupt information exchange (Sepulveda & Gabrielsson, 2013), limit entrepreneurs' ability to explore opportunities (Mort & Weerawardena, 2006), and have negative reputational impacts (Bembom, 2018; Coviello & Munro, 1997). This study found evidence that the domestic network ties strengthened the linear relationship (partially) and the international ties undermined it. These findings lead to the suggestion that international inter-firm relationships have more disadvantages than domestic ones, and that these drawbacks hamper the success of startups when expanding overseas. To sum it all up, the study revealed fresh insights, such as how lean startup principles may be used outside of its initial scope.

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Contents

1. Situation and complication

The formation of new enterprises has always played an important role in countries ' economic growth. Large companies generated the majority of new jobs prior to 1980 (Gompers, 1994). There was a huge increase in startups in the 21st century and SMEs began to add more jobs than Forbes 500 companies (Kane, 2010). A study found that, relative to larger businesses, startups were much more effective in creating new technologies (Maffini et al., 2009). As a driving force for innovation, startups are therefore an important driver of growth and progress. The grim reality, however, is that 90% of start-ups fail (Murphy, 2013), with most going out of business within the first four years of their life. For a number of factors, startups fail, including fierce competition from larger businesses, the necessity related to the production of innovative products and services tailored to the needs of consumers and the bargaining of prices on a very modest budget. Nevertheless, identifying customer needs is one of the most popular argument in conjunction to startup failure. The Lean Startup Methodology (hereinafter LSM) has gained much attention due to its structured approach and the hypothesized success it brings towards identifying actual customer demands. Lean startup approach can be explained as an organizational learning process which aims to help businesses to succeed and grow gradually in a business landscape riddled with uncertainty by changing the way that products are designed, and firms are built. It minimizes the waste, cost, and time to market by creating products which customers actually seek for.

Originally guided by practitioners, the lean startup approach has since drawn the attention of academics and policy makers alike. By transferring the attention of entrepreneurs from product creation to the equally significant parallel phase of customer development, the lean startup approach has revolutionized the concept of technology startups. The transition is from an infatuation with exceptional technology, product design, and usability to a concentration on consumer discovery and understanding as quickly as possible such that challenges can be solved before the eventual launch of the product. During the formative development of one's businesses, the lean startup methodology has authorized entrepreneurs several resources that could help them cope with uncertainty. It has, nevertheless, largely remained disconnected from another opportunity: to take into consideration of the rising significance of existing or evolving international marketplace (McPhee & Tanev, 2017).

The decision to venture abroad is considered as one of the key entrepreneurial decisions as internationalization is one of the main growth avenues for firms (Schumpeter, 1934). This is particularly true for smaller firms, for which going abroad may represent a leap in terms of resources and risks. Having stated that not many prior research projects has elaborated upon the comprehension of whether the LSM may be applied for the internationalization of entrepreneurial ventures and how this affects the internationalization process of it. Given the aforementioned distinctive perspectives of both of the research strands, i.e., LSM and the significance of internationalization, this research has the potential to provide a nuanced view on how the different dimensions of LSM can have a facilitating effect on the success of internationalization.

2. Research goal and research question

Lean start-up and lean innovation concepts have indeed been derived from the context of lean manufacturing of reducing waste and the non-value creating efforts, in order to highlight the central concept underlying lean innovation and lean start-up methodology (Rasmussen & Tanev, 2015; Haho & Kaartti, 2018). In related ways, lean terms were later introduced in, for e.g., in software development, lean development, and lean business (e.g., Ojasalo & Ojasalo, 2018). In addition to business developments, lean startup methodology can be used to facilitate the internationalization of "lean global startups" (Rasmussen & Tanev, 2015; Haho & Kaartti, 2018).

In terms of profitability and expansion for international businesses, internationalization has become imperative. Presently, internationalization is perhaps one of the most significant elements in a company's operation. Particularly for start-ups, thinking globally is a key-rule in starting new businesses nowadays. While many start-ups know that global thinking and international expansion are necessary conditions to meet, the underpinning actions needed are not always evident. Moreover, while internationalization is critical to business enterprises, it is largely unknown how companies like Born Globals are cultivating processes of quick and lean entry into foreign markets (Thi Thu Phuong, 2019). Prior studies have systematically studied the born global (Cavusgil & Knight, 2014) and international new venture manifestations (Oviatt & McDougall, 1994), the associated field of new technology-based or high-tech ventures and the amalgamation of internationalizations effects have remained untouched, leading to an investigation to fill this void in international business and lean startup literature (Kiederich, 2007). Therefore, it is thought provoking to investigate how the various dimensions of the lean startup methodology affects internationalization's success of high-tech ventures. The research question which is proposed next encompasses the research goal and is constructed as follows:

What is the effect of lean startup methodology on the internationalization's success of new high-tech ventures?

The theoretical framework (entailing the key concepts) is discussed next.

3. Theoretical Framework

In this section, the key concepts which is deemed necessary to answer the main research question is discussed and elaborated upon. At the outset, the paper will describe the historical basis of the subject matter in relation to the development of the lean startup methodology, followed by an explanation of the theory and how it is adapted within startups. Divergent from that, the second section should delve into the uncertainties and deficiencies of this method. The third section would review the internationalization concept thoroughly, by integrating past research concepts from International Business, International Entrepreneurship, and the influences to internationalization. Finally, the fourth section would consolidate the disjoint concepts of Lean Startups and internationalization into one single entity, aiding the process of the consequent conceptual framework and hypothesis development.

3.1 The Lean Startup methodology: origin and roots in research

With the works of Blank (2013) a prolific successful entrepreneur and Silicon Valley investor who managed to make the business creation process less daunting, the lean startup concept originated (Shepherd & Gruber, 2020). Blank questioned the notion that many start-ups initiate with a product concept and then devote tremendous time, effort, and financial capital on enhancing it without understanding whether they would satisfy consumer demands and promote revenue. Instead, he suggested that entrepreneurs could embrace an outward-looking learning approach, i.e., they should develop hypotheses about their start-up's central themes, get out of the building and validate their hypotheses, and thereafter modify their original ideas before a realistic business model is identified (Shepherd & Gruber, 2020). A first set of instruments (customer development, agile engineering, and minimum viable product (hereinafter MVP)) were presented by Blank to allow the business to achieve their activities of exploration, learning, and verification (Blank, 2013; Shepherd & Gruber, 2020).

Osterwalder and Pigneur (2010) made a further primary contribution to the lean startup methodology. In particular, Osterwalder (2004) placed the start-up in a deductive research context in his dissertation work (March & Smith, 1995) centered on the (natural) scientific process. Osterwalder and Pigneur (2010) created the "Business Model Canvas" by expanding on this dissertation, a method that aims to help entrepreneurs plan their business model, develop and test hypotheses about the company, and its

financial performance (and subsequently, by inference, the viability). They tried to point out, in particular, that a business model is a compositional tool that includes a set of variables and their interactions. This eventually enables the business processes of a particular organization to be articulated (Shepherd & Gruber, 2020).

Eric Ries, suggested the very next primary process of development of the lean startup methodology. He recognized key parallels between the objectives outlined in the evolving set of startup strategies and the Toyota Production Method, which became renowned as a lean manufacturing methodology. Ries termed the mixture of customer growth and iterative agile methods that he had studied in Blank 's class as "Lean Startup" and helped popularize the term in his 2011 book of the same title. In particular, he proposed that with a steering wheel called the Build-Measure-Learn-Feedback loop, the Lean Startup approach enables continuous changes. We will learn when and whether it is time to make a vital decision called a pivot through this steering phase or whether we should keep progressing (AKA "persevere") along our current trajectory. The Lean Startup provides methods to ramp and develop the enterprise with full throttle once we have an engine that is revved up (Shepherd & Gruber, 2020; Ries, 2011).

Finally, the "Business / Market Opportunity Navigator" developed by Gruber and Tal (2017) is the newest development to the lean startup platform. The lean startup tool, as Blank (2019) stated out, teaches how to quickly find a product / market match inside a market, and also how to pivot when certain assumptions are wrong. Nevertheless, they do not enable one to find out where to begin the quest for one's new venture. The new tool aims to do just that. Before you zoom in and build the business model or test your minimally viable goods, it offers a wide-lens viewpoint to identify distinct possible consumer domains for your invention. Until zooming in and developing the business strategy or evaluating the minimally viable goods, it offers an expansive-lens viewpoint to identify various possible market domains for the given invention. This technique can therefore act as the front end of the process of customer growth as it enables entrepreneurs to recognize and identify the most desirable starting point for the lean start-up process (Gruber et al., 2008, 2010, 2012, 2013; McGrath & MacMillan, 2000; Shepherd & Gruber, 2020; Tal-Itzkovitch et al., 2012).

3.2. The Lean Startup Methodology

In Steve Blank 's (2006) Customer Development Approach, which is an initiation to the principle of involving clients in order to evaluate crucial propositions in the early phases of a venture, the lean startup method has its roots. Blank's 'get out of the building' strategy seeks to obtain a better perception of the needs of consumers and collect feedback on unproven assumptions. The technique consists of four stages: the first two measures concentrate on the "pursuit" for a business model, whereas the third and fourth stage concentrate on the implementation of the business model as soon as the first two steps have been developed, assessed, and validated (Blank & Dorf, 2012). It defines the four phases as follows:

Customer discovery is the first component. The entrepreneur has a product idea at this point and the vision and drive to translate this idea for a new product that satisfies the needs of prospective customers. The path to customer exploration can be elaborated upon in three stages. The first is to define the "problem-solution" match under which the entrepreneur validates with stakeholders that a new feature can solve a known issue worth paying for. Secondly, the entrepreneur creates an MVP that contains the key value proposition and reaffirms the business proposition. Thirdly, by means of interviews and evaluation of data from the MVP, the entrepreneur would further set up a sales and marketing strategy to map out the sequence of activities which are needed to drive the prospect into the process of purchasing a product.

The second step i.e., consumer validation is entered as soon as the entrepreneur considers product-market match, validated by high user acceptance, huge proportion of paying subscribers, or improved retention rate. The entrepreneur legitimizes and recognizes the core value of the product at this point and acknowledges the consumer / market segment which the product will serve. With a crude pricing strategy, the entrepreneur targets early adopters and seeks to justify the roadmap of sales and marketing. The entrepreneur 'pivots' and makes new consumer demand assumptions and checks them again in phase 2 if the market cannot be found. The entrepreneur proves during this stage that every dollar put into marketing and sales succeeds in a return of more than one dollar. Essentially, the aim of this step is to legitimize a viable business model.

Stage three emphasizes on the acquisition / creation of clients: the purpose of this phase is to generate demand, induced by end-users and push demand through the company's distribution channel (Blank, 20006). Marketing costs are likely to be high during this process as it deals with the positioning and introduction of the product, and eventually generating demand. The startup team is likely to keep track of their expenditures and profits considering the fact that the previous process proved how much money is supposed to be poured into the marketing and sales funnel to acquire new customers. The company transitions from a learning and exploration-oriented client development team into a structured corporation in the final phase. In order to utilize the organization at its fullest, departments such as marketing, distribution, and corporate development are set up.

Blank's (2006) Customer Development approach as adopted by Cooper & Vlaskovits (2010) is depicted in fig. 1 below:
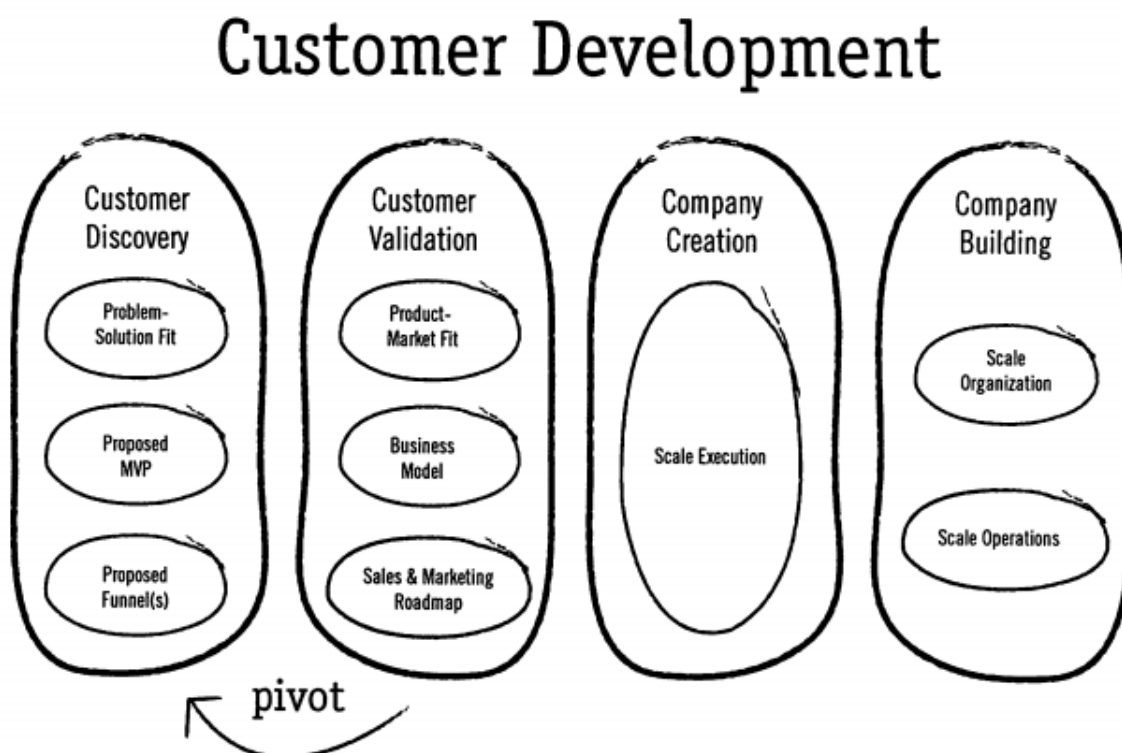
Figure 1: Search and execution of the business model (Blank, 2006; Cooper & Vlaskovits, 2010)

Eric Ries was Blank's student and merged speedy-release, iterative development methodologies (e.g., agile development) with Blank's notions and commercially exploited this methodology in his famous book "The Lean Startup: How Today's entrepreneurs use continuous innovation to build radically

effective companies" (Ries, 2011). Startups frequently compete in extremely unpredictable environments, not understanding precisely what the consumer needs, how much they are going to pay for the product, and how the product will look like. Constructing a product based solely on the presumptions of an entrepreneur is thus very hazardous and sometimes leads to failure. The fundamental premise of the lean startup methodology is to maximize productivity while reducing waste. Waste can be described as cost and resources spent by entrepreneurs on the creation of products which nobody customer wants (Ries, 2011).

3.2.1. The hunt for an expandable business model

The lean startup approach focuses on creating continuous minor changes to the product driven by the 'build-measure-learn' loop (hereinafter BML loop; depicted in fig. 2) in the quest for an extensible business model. Validated learning seems to be at the heart of this loop and could be characterized as the method of empirically proving that a squad has learned precious truth about the existing and potential market opportunities of a startup (Ries, 2011). **Build**, the first phase of this loop, is central to the creation of a "minimum viable product" (MVP) and the incorporation of earlier researched principles during experimentation. A MPV is described as the variant of a new product that encourages players to gather, with the least amount of effort, the appropriate amount of validated learning about clients (Ries, 2009). Accordingly, in order to obtain feedback, only the fundamental features of the product are demonstrated to the consumer. After each round of the loop, which must be checked and learnt from, new functionalities of the system will be added to the MVP (Ghorashi, 2015; Ries 2011).

Measure is followed by build, in the loop. This stage should determine if, after adding a function to the package, consumer value increases or not. In order to judge the success of an organization based on its validated learning, Ries designed a method called "innovation accounting" techniques. In order to establish a consistent cause and effect interaction between a new feature and its effects, innovation accounting benchmarks must be 'actionable' (Harms, 2015). Secondly, the metric should be fully accessible, which implies that the measures should be outlined as simply and unambiguously as possible by the metric. Third, in order for being used as a legitimate data base for personnel, the measure should be "auditable" (Harms 2015; Ries, 2011). Metrics like those of quantity of proposals considered, number of iterations carried out, cost per prototype, cost of reaching product / market compatibility, and ROI are suggested as credible sources for assessing success by practitioners (Ownes 2014; Ries, 2011).

Learn is the third phase of the method which tests the preceding phase's calculated results. Depending on the information,the organization has to choose whether to persevere with the current plan or pivot. A pivot is described as "*a structured course correction designed to test a new fundamental hypothesis about the product, strategy and engine of growth. A pivot requires that we keep one foot rooted in what we have learned so far, while making a fundamental change in strategy in order to seek even greater validated learning*" (Ries, 2011, pp. 147, 152). The learned anecdotes have to be introduced as new functionality in the MVP to complete the process, and a new build-measure-learn loop can be initiated as a response. At this point, the organization must attempt to speed up the loop such that validated learning is streamlined and the product / market fit is established.
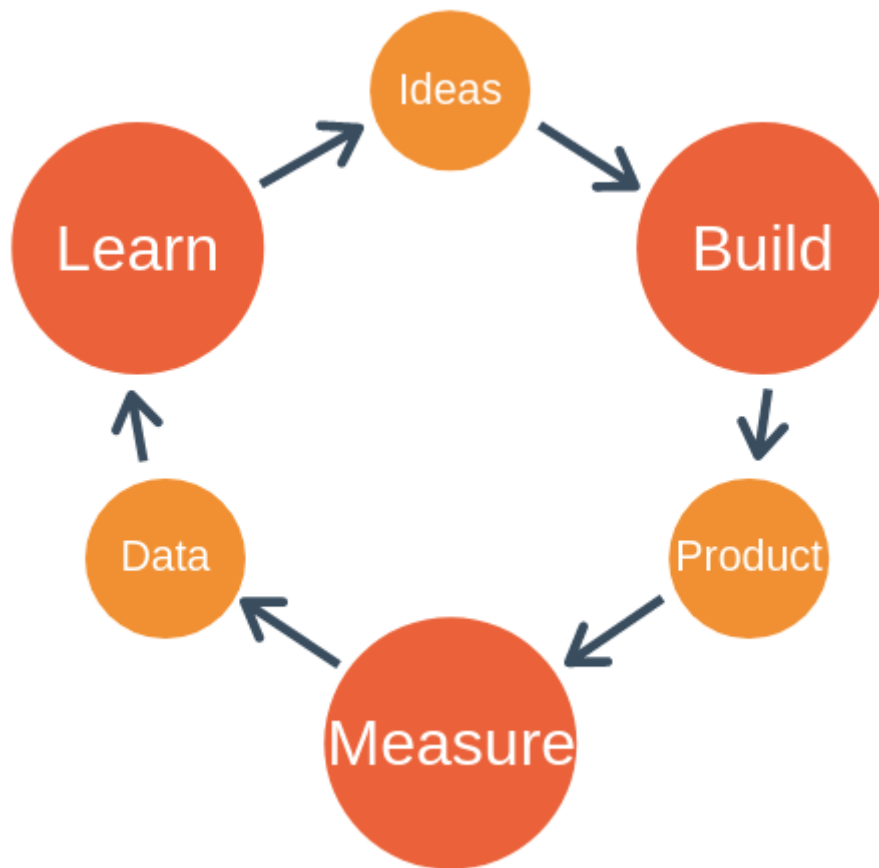
Figure 2: Build-Measure-Learn Loop (Ries,2011)

3.2.2. Deployment of the business model

When the enterprise is best suited for the product / market alignment, it is time to pursue scaling and stimulating growth, for the purpose of creating a profitable and imperishable business (Ries, 2011). Analogous to the manufacturing process of Toyota, proponents of the "lean" methodology fabricate their products in small lots. This enables start-ups to easily recognize issues in consistency and to avoid more problems later, leading to a more productive operation. Such a methodology allows for continuous development, and as per Ries (2011), the advancement of the following three factors which is elaborated upon next, allows ventures beyond the software sector to take advantage of this method. The assumption that "hardware is becoming software" is the first factor. Products such as cars have greater components of their worth decided by the software they bring, respectively. Second, thanks to the introduction of machines that are designed for rapid changes, simple production changes allow cost-effective product customization. Secondly, thanks to the development of machines which are mostly engineered for accelerated changeover, rapid production changes can be realized and thus enabling for product customization cost effectively. Thirdly, 3D printers and other rapid prototyping instruments allow firms to push through the BML loop faster, improving their capacity to learn more efficiently from their clients and further contributing to an improved competitive edge. The ultimate goal of startups is to become a sustainable enterprise while manufacturing small lots.

Eric Ries identifies three competitive growth drivers, i.e., sticky, viral, or paid, to be utilized by a venture in order to grow to a profitable enterprise. In order to continuously monitor the performance of the latest products and evaluate new experiments, each engine needs a focus on specific metrics. The start-up could indeed discover which growth driver is most successful for its venture. As the start-up continues to expand, the focus should be on keeping the expansion engine running and the transition from a start-up to an enterprise that is as adaptable and swift with regard to the obstacles it faces. In

order to minimize waste and continue to stay as productive as possible, validated learning and experimentation should serve as the foundation of all future decisions.

In an attempt to survive in the future, an organization embracing lean concepts should be appropriately organized. Three institutional features are critical for both internal and external start-up teams, according to Ries (2011), and need to have the support of the top management. The three institutional / structural characteristics are securement of scarce resources, independent authority to develop their business, and a vested interest in the outcomes. In principle, startups are only confined to a limited number of resources, and this should be safeguarded against interference at all times. Secondly, startup teams should have a truly independent authorization. This ensures that individuals are free to conduct experiments without first needing to obtain permits. In order to provide full-time participation from all branches of the business, Ries (2011) suggests startups to be fully cross-functional.

In essence, lean startups utilize a methodical approach to deliver a target product as easily and effectively as possible into the hands of the consumer. The build-measure-learn loop is the central element of the strategy that corresponds with the development of a minimum viable product (MVP). Once the MPV is created, by speeding up the feedback mechanism and ramping up the validated learning, the startup aims to achieve product / market compatibility. When the product / market match is met, the start-up aims to verify a scalable business model. Whenever the successful market model is proven, it is possible to use one of the three growth engines to maximize the product 's revenue. A schematic of the lean startup process as adopted from Ries (2011), is visually depicted below in figure 3:
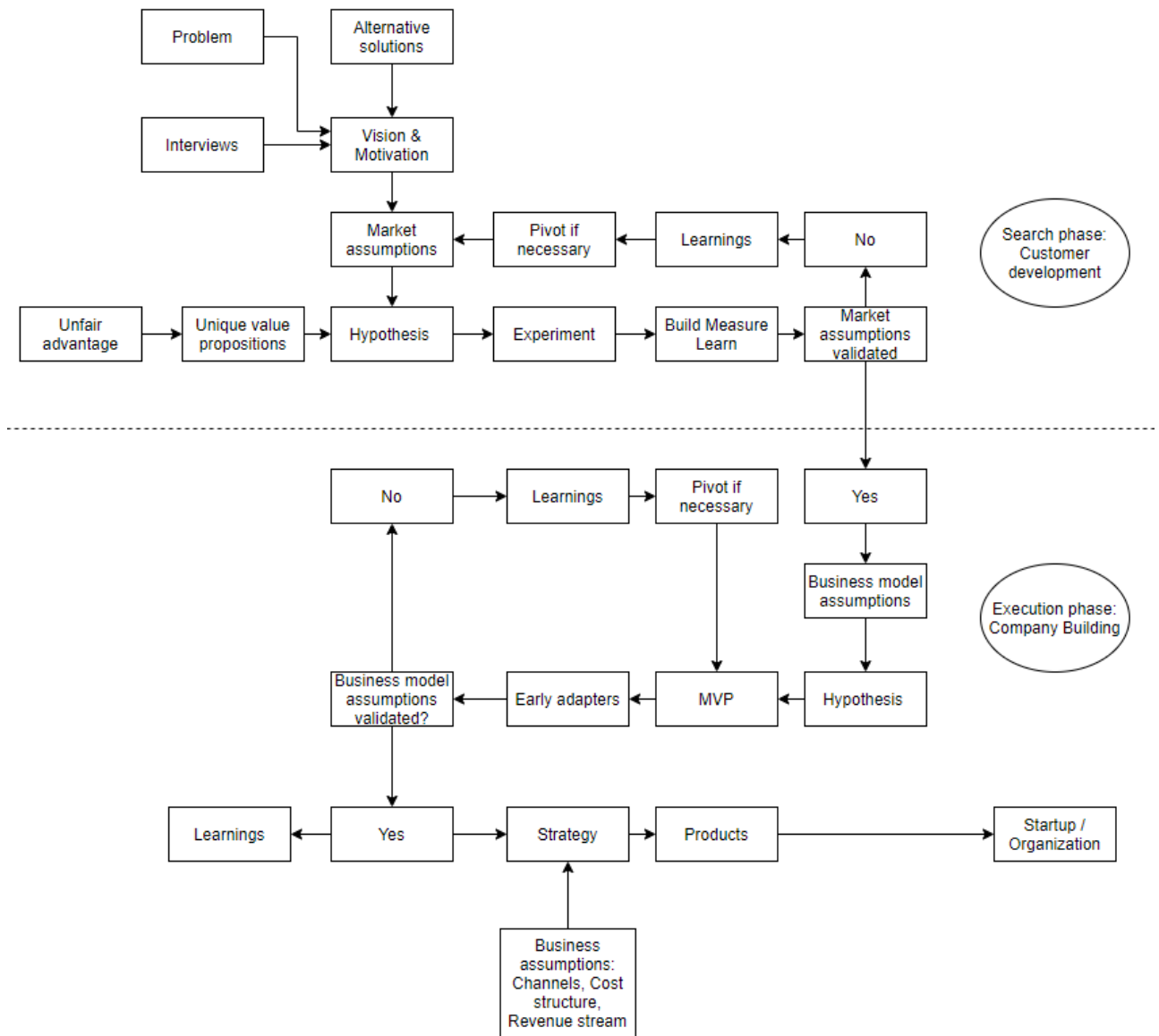
Figure 3: Startup development using the iterative Lean Startup Methodology (adapted from Ries, 2011)

After having elaborated the lean startup method, i.e., development overview, theoretical explanation and how it can be applied within startup ecosystem as guided by Eric Ries, the next section would inquire regarding an impeding factor i.e., the degree of uncertainty that could affect the outcome of a lean startup project.

3.2.3. Uncertainties

As stated before, the lean startup approach is developed for ventures that seek to develop innovative goods and services under extreme circumstances of intense instability and uncertainty. A wide spectrum of innovation uncertainties was presented by Jalonen & Lehtonen (2011) and eight types of uncertainty were defined in the process of innovation. These are: technological, market, regulatory, social, and political, acceptance and legitimacy, managerial, timing and consequence uncertainty. From amongst the uncertainties mentioned above, technological and market uncertainties concerns enterprises, including startups the most (Jalonen & Lehtonen, 2011) and could therefore be used as antecedents in the study of multiple theories. Market uncertainty emerges from unknown factors associated with addressing the problem, like those of hidden consumer desires. The more unclear consumer demand considerations are, the greater the ambiguity about the market. Uncertainty in

technology is the result of unknown technologies that may emerge or combine to build a new solution (Dyer et al., 2014).

Four quadrants are depicted in the figure 4 below in accordance with the ambiguities mentioned previously, ranging from low market uncertainty and low technological uncertainty to high market uncertainty and high technological uncertainty.
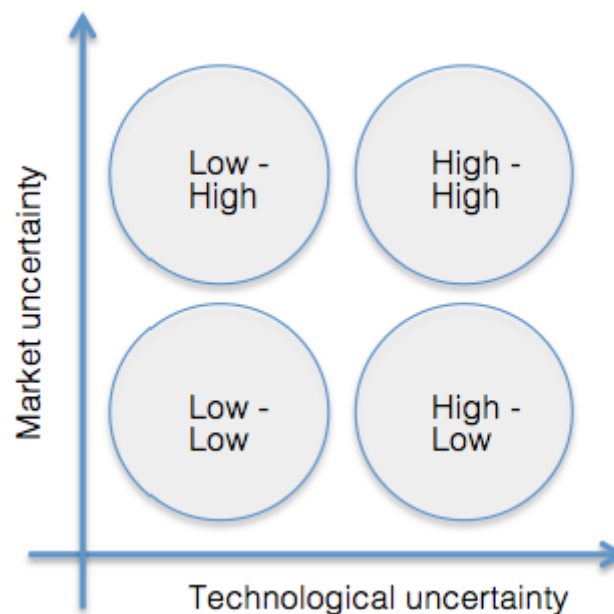
Figure 4: Aggregation matrix of market and technological uncertainty

The low-low constellation, which typifies much of the small business setting, is the first quadrant. This dimension consists mostly of low-tech, imitative companies such as resellers (e.g., Wal-Mart, Lidl) and traditional providers (hair styling, dry cleaning) that only deliver innovations that are not revolutionary. Since the demand and technologies are recognized and/or can be easily accessed, it is possible to apply systematic business strategy to overcome the uncertainty and improve efficiency. A degree of long-term orientation and foresight, formalization, and monitoring is allowed by the market and technology landscape (Kraus et al., 2006). It seems to be superfluous to implement the lean startup approach here and the iterative development would add time and money to the long-term business planning phase (Koen, 2015).

The dimension of high technology uncertainty and low market uncertainty enables the uncertainty to be resolved by a systematic approach to innovation and new product development (Harms et al., 2015). This condition is primarily seen in enterprises such as those in the oil and gas industry because it is more or less possible to estimate the market for the goods, but the technological solution for new products may still be unknown. In order to minimize the complexity of technology and reduce the time-to-market, Cooper (1990) implemented the stage gate model. Cooper (1990) found that insufficient market evaluation and a lack of market orientation are one of the key reasons for new product disappointments, especially in industrial goods and high-technology companies. Prior to actually reaching the process in which technology creation is initiated and 'heavy capital' is invested, the stage-gate method needs comprehensive assessment of the business concept and market potential (Cooper, 1990). Gatekeepers (mostly senior executives) assess the status of the inputs or milestones in order to ensure technical quality during the innovation process. In addition, they determine whether the performance of the project can result in a go/ kill/ hold or recycle recommendation from an economic and business perspective. Third, for the next step, they authorize the implementation plan

and assign the required resources (Cooper, 1990). Therefore, in this manner, the strategy focuses especially on eliminating unnecessary work and moving quickly to finished goods (Cooper, 2008). Even though the methodology of the stage gate exhibits parallels with the lean startup method (DelVecchio et al., 2013), the approach of the stage gate handles the technical uncertainty more adequately (when used correctly) as it eliminates projects in a timely manner when specifications are not satisfied while pivoting is suggested by the lean startup framework. This might lead to unintentional wasting money on an innovation which might actually not work.

There is a greater level of technical and market uncertainty in the upper right - hand corner of the matrix. This variation can be seen in sectors such as the pharmaceutical and medical machinery fields. These days, a derivative of the stage gate model called the NexGen Stage-Gate method is one of the innovation tools used in such situations (Cooper, 2006; Cooper, 2008). The gates are still technology oriented, but during the developmental stages, the incorporation of spiral development enables a business to engage much more with consumer. Therefore, when establishing the technology, the contact mostly with consumer makes this configuration more versatile than that of the standard model of the stage gate. Since this market and technological characteristics of the products are not established at the early stages of these projects, it is important to determine at an early stage the customers, consumer specifications or possible functionality of the technology that has not yet been developed. Therefore, as technical characteristics become apparent, businesses frequently use Cooper's Next-Gen Stage-Gate method to increase engagement during development (Harms et al., 2015).

A market with low technical uncertainty and high market uncertainty enables an entrepreneur or organization to exploit new products and markets with its technological competencies (Danneels, 2007). When the market volatility is high, the lean startup strategy plays to its strengths and might direct businesses to exploit the market potential that could be accessible (Ries, 2011). As stated earlier, this approach enables quick and inexpensive experiments, in order to test hypotheses about the needs of customers. In this manner, several applications within the technology can be evaluated and its product / market fit optimized by the entrepreneur or company. In addition, the pain points of consumers can be established early on in the process by engaging with clients during early development phases, contributing to the creation of a product for a validated market (Blank, 2013; Ries, 2011).

In the period between 2002 and 2011, Dyer et al. (2014) researched demand (market) and technological uncertainty (depicted in fig. 5) across varied sectors. Even though his investigation noted that the metrics are not ideal and certain market conditions have changed dramatically due to disruption, the figure following offers a strong identification of sectors that face the highest and the lowest levels of uncertainty in comparison.

DEMAND AND TECHNOLOGICAL UNCERTAINTY BY INDUSTRY, 2002-2011

Figure 5: Demand and technological uncertainty (Dyer et al., 2014)

Having reviewed the methodologies aimed at resolving technical and market uncertainty in the innovation process, the approaches are outlined in an overview as illustrated in figure 6 below:
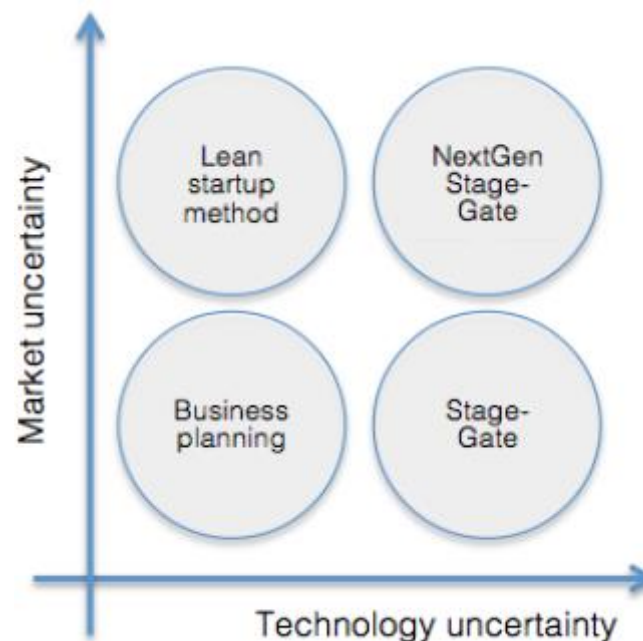

Figure 6: Various methodologies aimed at resolving uncertainties (Harms et al., 2015)

3.2.4. Deficiencies and challenges of the method

Ghorashi (2015) explored the various aspects of knowledge management that are suggested in the build-measure-learn loop phases and whether they are relevant in terms of independent startup capabilities. Ghorashi's qualitative analysis found that the specifications of the lean startup approach varied substantially from the startups' capabilities in terms of the degree of assessment and competence demanded for measurement. In practice, he found that startups have received their inspiration from external sources for new feature trials. His work demonstrates that the lean startup approach should not be solely pursued by internal sources but expanded with external sources as an inspiration.

Harms et al. (2015) explored under what circumstances the lean start-up approach could be beneficial for materials and other science-based businesses and how much the method could be implemented beyond the framework of Silicon Valley. The scholars suggest that when implemented outside of software and product development context, the approach needs essential customization to be able to work in an operational setting (Hackett, 2012; Harms et al. 2015). They recognized that the " need " and " solution " should not only be handled as a source of risk that can make or break a venture, but also the 'network' part is unequivocally important. Factors such as regulations, buying center issues and insurer issues in the life science industry are included in the network aspect, as they carry additional risk to the assumptions of the business. In addition, materiel-based companies also form part of the value chain with several other partners. Instead of carefully experimenting with selecting markets, certain partners and other actors' requirements could influence the direction in which an organization develops.

In an Indonesian B2B startup, Nirwan & Dhewanto (2014) discussed the obstacles in the implementation of lean startup methodology. In order to get input and test assumptions, this case study revealed that the 'get out of the house' strategy was deemed challenging due to the obstacles to reaching clients. In addition, it seemed difficult to determine whether or not to pivot considering the fact that the suggested solution was ultimately an incremental offering with a limited customer base. The third challenge identified in this study was induced by the regulation and administration needed to contact customers, resulting in a decreased pace of iteration. The establishment of the MVP led to the final challenge, as it caused confusion within the startup. In order to establish confidence with its client, the start-up had to have a reliable MVP, but could not afford to expand the MVP too much.

In three fortune 100 firms, Koen (2015) encountered similar functional difficulties in applying the lean startup approach and educating lean startup in an MBA course. These challenges are linked to the basic tenets of the lean startup philosophy and, if not implemented correctly, could adversely impact the result of a lean startup project. Koen states that ventures frequently struggle to fulfill the theory 's recommendations (e.g., because of misunderstanding / ambiguity), making the method even more complicated. The variables are explained as follows:

The first element is awareness of the problem. The lean startup approach can contribute to the most effective product / market match when a business completely recognizes the unmet needs of its clients. Secondly, by solving the problem, i.e., by defining the value of the solution for the consumer determines the increased perceived value of the customers in the context of the solution of the problem. This aspect corresponds to the first two phases of product-market fit i.e., discovery and validation and is necessary in order to produce a product that consumers actually want. The third element for successful implementation of the lean startup process is selecting the right clients to test hypotheses. In order to test assumptions, asking the right customers is an integral component of the theory in the measurement stage of the Build-Measure-Learn sequence. Questioning the incorrect customers could lead to an inaccurate conclusion and ultimately to a market-failing product. The

fourth element mentioned by Koen (2015) was to perceive the prototype as MVP. Developing an MVP that only evaluates basic solution characteristics enables companies to assess assumptions effectively without spending time and resources on unnecessary functionality. Therefore, in the quest for a viable business model process, this component is an important element. The final aspect is to make accurate assumptions about cost structures, channels, and rates of adoption. According to Bertels et al. (2015), these three elements of a modern business model are most vulnerable to erroneous assumptions. This aspect is therefore most critical for a lean startup project during the final phase. As defined by Ries (2011), these variables are basic components of the lean startup theory. Scientific studies and practitioners, however, criticize the theory for the fact that it continues to be difficult to incorporate these elements in practice (e.g., Koen, 2015; Nirwan & Dhewanto, 2014). The next section will discuss how new ventures could overcome these criticisms / drawbacks, leading to suggestions for a stronger application of the theory.

In order to cover factors such as regulation and consumer purchase problems, Harms et al. (2015) suggest incorporating a 'network' dimension to the theory. These variables conform to Nirwan & Dhewanto's (2014) stated barriers, and thus suggest that the theory needs adjustments to the environment of an enterprise. Furthermore, Müller & Thöring (2012) point out that the impact of tacit elements on the success of innovation projects was not included in their study. In order to help the innovation departments, the lean startup philosophy identifies implicit factors such as the team size and leadership, resources, employee compensation and the presence of an innovation sandbox as guiding principles that an enterprise can provide.

To summarize the application of the Lean Startup Methodology and the associated criticisms, the next figure (fig. 8) offers a visual overview which incorporates the suggestions in order to mitigate the drawbacks of the approach:
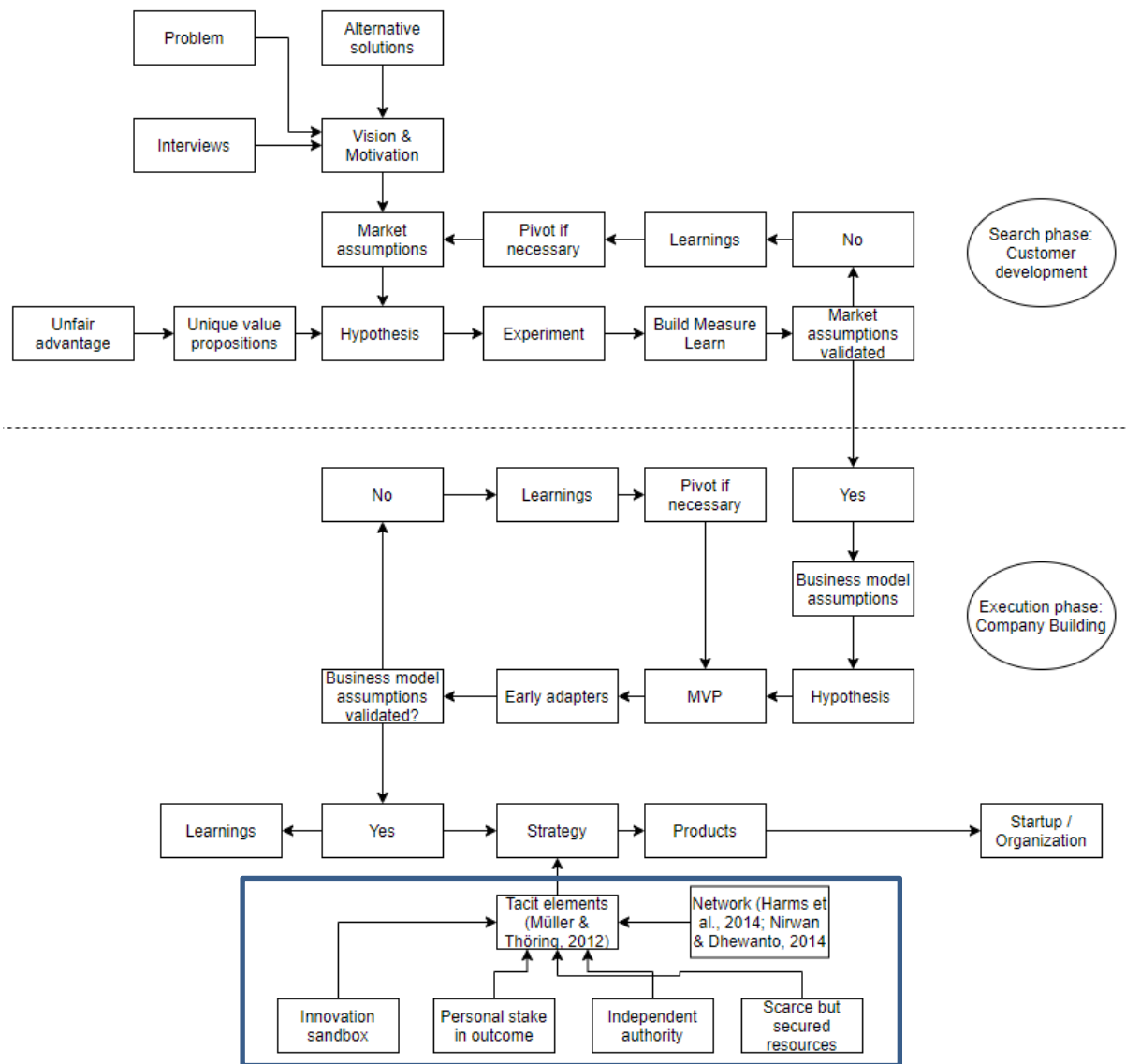
Figure 8: Modification of the iterative Lean Startup Methodology, mitigating the drawbacks (based on Harms et al., 2015; Müller & Thöring, 2012; Nirwan & Dhewanto, 2014; Ries, 2011)

After having sufficiently elaborated the lean startup methodology in considerable detail, the final section of this chapter follows suit on characterizing internationalization.

3.3. The path of international expansions

Literature on theories of internationalization will be discussed in the following subsections. In addition to that, an overview of conventional literature on internationalization will be presented. The domain of International Entrepreneurship (IE) and two special ways of rapidly internationalizing businesses, i.e., Born Globals and International New Ventures, will subsequently be introduced. In addition, significant drivers and liabilities for internationalization will be discussed.

3.3.1. Characterizing internationalization

For many decades, the process of internationalization has intrigued scholars and formed the basis for the scientific discipline of International Business (IB). Internationalization is described by Welch and Luostarinen (1988, p.36) as "the process of increasing participation in international operations". The authors show that both importing and exporting activities can be associated with increases in international participation. Calof and Beamish (1995, p. 116) suggest that internationalization refers to "the process of adapting firm's operations (strategy, structure, resources, etc.) to international environments" in order to provide a more holistic definition. Through doing so the authors accept the probability that there could still be a backward method of internationalization. This implies that approaches for internationalization could involve plans for leaving foreign markets as well. Ever since the publication of these papers, the research focus was on the defining the term internationalization, and researchers such as Welch and Luostarinen (1988) as well as Calof and Beamish (1995) were cited frequently. However, the academic community's emphasis has changed from the description of the term to the study of motives for internationalization over the last few years.

3.3.2. Theories of internationalization in International Business (IB)

Over the course of time, scientists have developed a range of hypotheses seeking to understand the behavior of businesses in internationalization. In particular, it is generally possible to categorize the various schools of internationalization into (1) economic, (2) behavioral and (3) network perspectives. These distinct groups are discussed and juxtaposed in the following.

3.3.2.1. Economic rationale to internationalization

Many researchers made the efforts in explaining the internationalization behavior of businesses, transpired by the reasoning of economic theories in this context. Vernon published one of the first papers in the field (1966). With the so-called Product Cycle Theory, also known as the three-stage model, the author argued that companies must initially seek to satisfy the domestic market. The second phase would only commence until the competition had become price-based and the offerings had matured. During this process, firms try to engage in foreign direct investment (FDI) in comparatively low-cost countries. Here, firms are seeking to improve their productive capacity by achieving optimum standardization and relatively inexpensive input factors. In the final stretch, organizations devote themselves to overseas procurement activities in order to decrease the total cost of production. Recent insights have diminished the predictive ability of the theory (Vernon, 1979). However, Garland et al. (1990) continue to insist in support of its continued relevance in the sense of smaller companies.

Another classical theory of internationalization that builds on economic logic is the Oligopolistic Reaction Theory (Knickerbocker, 1973). The author explains that one company's intention to invest in a foreign nation generates incentives for competing companies to invest in the very same country. The underlying concept stems from a strategy for risk mitigation that seeks to avoid discrepancies between competing companies. As a result, internationalizing companies seek to face the equivalent opportunities and obstacles as their competition. Although Knickerbocker's (1973) rationale explains the actions of firms that are competing in foreign markets, it obviously falls short of describing the internationalization behavior patterns of the first company to participate in FDI.

Hymer (1976) grounded his rhetoric on micro-economic foundations and thus created a landmark in literary works on internationalization. The Monopolistic Advantage Theory (Hymer, 1976; Caves, 1971) emphasizes the significance of avoiding markets with perfect competition rather than concentrating on disparities in interest rates, uncertainty, and risk. As per the researcher, if businesses enjoy certain superiority over local competition, imperfect financial markets can be exacerbated. These may entail superior leadership, superior marketing abilities, or economies of scale. It is argued that businesses can mitigate the adverse effect of insufficient market knowledge by transmitting such benefits to the international market at practically no expense.

Furthermore, Buckely and Casson (1976), Magee (1977) and Hennart (1982) published the Internalization Theory, focusing on imprecision, as a rationale for FDI in intermediary product markets. The concept is strongly analogous to the dynamics of transaction costs (Coase, 1937) and evaluates the costs associated in market transactions relative to the costs of internally performing the task. The subsequent logic suggests that when the overall cost of the market transaction is greater than the cost of separately entering the international market, internalization is the preferable route.

Lastly, the Elective Paradigm (Dunning, 1980) demonstrates the progression of the internalization theory mentioned above. The model is often referred to as the OLI-Framework, corresponding to the first letters of three distinctive advantages that must be present throughout an organization in order to partake in FDI.

3.3.2.2. Behavioral rationale to internationalization

The first concept to describe the process of internationalization centered on behavioral theory was performed by Aharoni (1966) and designated it as the Decision Process Model. The author considers FDI to be a complex social process. For the first time human qualities such as emotions (e.g., apprehension and anxiety) and attributes (e.g., risk-aversion) were incorporated by considering the manager's viewpoint. The evaluation of accountable managers' decision-making process highlights that "the first foreign direct investment decision is to a large extent a trip to the unknown" (Aharoni, 1966, p.9). It is therefore crucial for the manager to recognize compelling motivations that can explain such a risky endeavor. Motive reasons may consist of the fear of market loss, solid international market performance of comparable organizations or severe domestic competition.

Furthermore, the Uppsala Model is also the most popular theory of internationalization that derives on behavioral theory (Johanson & Vahlne, 1977). The researchers were able to determine a particular internationalization trend, i.e. "The Establishment Chain", based on scientific observations of Swedish-owned foreign subsidiaries. In accordance with the observations of many different academics (e.g., Carlson, 1975; Hörnell, Vahlne and Wiedersheim-Paul, 1973; Johanson, 1966; Nellbeck, 1967), it was shown that companies have often initiated their internationalization operation by methods of ad hoc exports. Successively, the establishment chain was enhanced by the appearance of distribution intermediaries (e.g., sales or commercial agents), followed by the deployment of the specialized sales force. Only after these processes had been completed would organizations plan to completely participate in FDI and set up manufacturing facilities in global markets.

The concept is based on another common notion termed as psychic distance with regard to market selection. Psychic distance corresponds to variables such as culture and customs which proves to be difficult to apprehend the international context optimally. Physic distance, unlike conventional geographical distance, first offered justifications for the frequently encountered behavior of converging considerable distances in international business (for instance, U.K. based firms entering the Australian market).

Having addressed the conventional viewpoint of firm internationalization, more recent insights into international business can be reflected upon. The main role of networks in the choice of markets and the mode of market entry was defined by Coviello and Munro (1995, 1997). Correspondingly, Welch and Welch (1996) analyzed the influence of networks on companies' internationalization strategies. Researchers have examined networks and their implications on the location of FDI in several other studies (Chen and Chen, 1998) and even the first internationalization attempt (Ellis, 2000). The number of publications showing interest in the position of the networks is extensive and the articles referred represents just a small portion of the number.

Johanson and Vahlne (2009) updated their 1977 model in recognition of the significance of networks as well as the evolving economic and regulatory climate. The researchers indicate that markets serve networks that are intertwined with all participants. Relationships between players may be dependent on very complicated and often unseen patterns. Its placement within such networks plays an important role in achieving a company's objectives. This suggests that on the one hand, a central and well-connected function is essential for optimum result. And on the other hand, businesses seeking to penetrate new markets (and networks) will often face "outsidership" liability as opposed to a role of network "insidership".

In addition to the topic of a company's accessibility within a business network, Johanson and Vahlne (2009) also highlight the opportunity for learning and building trust. The research defines the process of knowledge development as the "outcome of the confrontation between producer knowledge and user knowledge" (Johanson & Vahlne, 2009, p. 1414) in agreement with previous findings of Hägg and Johanson (1982). Subsequently, exchanges with other firms, vendors, investors, and consumers can also be used by enterprises as an incentive to generate awareness and develop skills.

3.3.3. Theories of internationalization in International Entrepreneurship (IE)
The following segment will address the actions of entrepreneurial firms in terms of internationalization. The popular notions cited above have been criticized for their shortcomings (Reid, 1983; Turnbull, 1987). In addition, a large number of firms have recently exhibited a distinct conduct that does not conform with the predicted trends. At the heart of the debate are these new forms of enterprises, dubbed as Born Globals and International New Ventures.

3.3.3.1. Introducing International Entrepreneurship
Principally, international business literature centered on the process of expansion of large and extant multinational corporations (MNEs). Contrary to this, entrepreneurship scholars, predicated their emphasis on the fields of venture development and SME management in the domestic perspective (McDougall and Oviatt, 2000). Only with the advent of international entrepreneurship did scholars begin to discuss the convergence of the two fields. Although the parameters between the disciplines of international business (IB), entrepreneurship and international entrepreneurship (IE) are not very well specified, IE is nonetheless perceived to be a unique, independent, and constantly developing area of study.

Wright and Ricks (1994) arrived quickly to the consensus that International Entrepreneurship constitutes a significant future area of study that is profoundly important to both the academic and business world. In part, this importance emerges from the immense shifts in the global climate that have taken place throughout the early stages of development of conventional concepts on business internationalization. Technological advancements and rising globalization have generated new competitive environments (Hitt, Keats and DeMaire, 1998). As a result of these developments, Oviatt and McDougall (1999) recognized a growth in foreign entrepreneurial activity, accelerated in

particular by enhanced information technologies, logistic management, and a global decline in protectionist measures.

Many scholars have attempted to describe IE in a number of ways (e.g., Covin and Slevin, 1989; McDougall and Oviatt, 1997; Timmons, 1994) and still no final common ground has been achieved. One of most quoted term corresponds to the work of McDougall and Oviatt (2000), who describe IE as "a combination of innovative, proactive, and risk-seeking behavior that crosses national borders and is intended to create value in organizations" (McDougall and Oviatt, 2000, p. 903).

3.3.3.2. The accelerated path to Internationalization – International New Ventures and Born Globals

Throughout the last decade, the IE field has started to disrupt conventional IB research. Especially, numerous studies have shown that a new form of organization has arisen which does not embrace the conventional, gradual phases of internationalization. By comparison, these companies have already started their journey of internationalization since their conception. Companies adopting this unorthodox practice have been examined and identified by a number of scholars. Jolly et al. (1992) were among the first to analyze the defined direction of high-tech start-ups. The word Born Global was proposed by McKinsey & Company (1993) and even further devised by Rennie (1993) as well as Knight and Cavusgil (1996). In a widely quoted article, Oviatt and McDougall (1994) identified a related term, i.e., the International New Ventures (INV), as "business organization that, from inception, seeks to derive significant competitive advantage from the use of resources and the sale of outputs in multiple countries. The distinguishing feature of these start-ups is that their origins are international, as demonstrated by observable and significant commitments of resources (e.g., material, people, financing, time) in more than one nation" (Oviatt and McDougall, 1994, p.59). Centered on a 2x2 matrix, the authors established a typology of INVs with dimensions corresponding to the range of supply / value chain operations between countries and the overall number of participating countries. The ensuing matrix of INVs is illustrated in figure 9 next.

Figure 9: Types of international new ventures (Oviatt and McDougall, 1994, p.59)

The matrix "Global Startup" can be characterized by the synthesis of a vast range of value chain operations controlled through a substantial range of countries. In comparison, this form of INV can be considered the most inextricably connected to the Born Globals theory (Knight and Cavusgil, 1996; McKinsey & Company, 1993; Rennie, 1993). Born Globals was identified in a more recent study as a "business organization, that from or near their founding, seek(s) superior international business performance from the application of knowledge-based resources to the sale of outputs in multiple countries" (Knight and Cavusgil, 2004, p.1). More precisely, at least 25% of the earnings come from overseas markets (Knight and Cavusgil, 2004), with an average of the first internationalization operations happening mostly in the first three years of the company's lifetime (Knight et al., 2004).

It seems that, after analyzing the related literature, there is still no clarity on the precise meaning of the two concepts. Although the definitions remain somewhat close, it is fair to assume that the Born Global reflects a much greater internationalization particularity than the INV in general.

3.3.4. Influences to internationalization

The notion of Born Globals and International New ventures were presented in the preceding segment. In addition to the interpretation of these concepts, recognizing the major characteristics contributing to and/or inhibiting internationalization is important. In the context of International Entrepreneurship, the following subsections describe the triggers and vulnerabilities of internationalization.

3.3.4.1. Drivers

The forces that contributed to the rise of progressively internationalizing ventures and those that positively affected the pace of internationalization have significantly fascinated scholars. In addition to developments in the international landscape, including the decreased transportation and connectivity costs (Holstein, 1992), increased usability, knowledge development and utilization (Czinkota and Ronkainen, 1995; Dunning, 2000; Evans and Wurster, 1999; Nordström, 1991) and even the shifting position of ICT (Dunning and Wymbs; 2001), researchers have examined numerous company-specific characteristics.

One channel of research claims that the particular sector where the company operates in, has a considerable effect on the conduct of internationalization (Preece et al., 1998). Lindqvist (1991), for example suggests high tech industries comprise a natural domain for Born Globals. Analogously, early internationalization practices were strongly associated with the focus of a business into niche markets (e.g., McKinsey & Company, 1993; Zuchella, 2001). Here, data is primarily drawn from the excellent results of foreign niche players and their high ratios of export strength (Calof, 1994; Gomes-Casseres, 1997; Kohn, 1997).

A second research workflow concentrated on the function of location-specific impacts. These apply to the local clusters and co-location effects (e.g., Bell et al., 2001; Dunning, 2000; Sovell and Zander, 1995). Companies in networks or clusters have been shown to reap the benefits of firm and geographical comparative advantages in order to extend to international markets (Beccatini, 2000). In addition, the abundance of professional and specialized labor in location-specific clusters, along with convenient access to knowledge, provides a strategic advantage which is a core driver of the company's international growth.

Other key drivers include the management team's attributes, such as the level of resource devotion by upper executives (Welch and Loustarinen, 1988) and the founder's global orientation (Rialp-Criado et al., 2010). A variety of scholars have addressed entrepreneur-specific drivers rigorously over the years (e.g., Bloodgood et al., 1996; Oviatt & McDougall, 1994). Oviatt and McDougall (1994) identifies INV developers as entrepreneurs who are aware of opportunities and are capable to globally integrate resources across boundaries in a specific way. This awareness is achieved by skills learned during previous operations and is focused largely on their networks, experience, and context. In parallel with Oviatt & McDougall's rationale (1994), the function of a founder's previous experience is also stressed by other scholars. Onetti et al. (2010) emphasize entrepreneurial experience as the potential driver of Born Globals' popularization, simultaneously Bloodgood et al. (1996) also refer to the positive relationship between the magnitude of founders' international experience and the tempo of venture's internationalization.

Remarkably, networks have also been a significant area of study in the context of IE. Network ties serve a crucial role in fostering the international activities, specifically with respect to entrepreneurial

firms (Kontinen and Ojala, 2011). The stance of international networks of entrepreneurs and organizations is strongly associated with network-specific drivers (e.g., Nooteboom, 2004; Petersen et al., 2002). Networks can support entrepreneurial firms with accessibility to knowledge, human resources, and finance, according to Bell et al. (2003). In addition, networks are critical for entrepreneurial firms with regards to speeding up the learning mechanism (Eriksson et al., 1997), improving the international perspective (Oviatt and McDougall, 2005), acquiring useful information and expertise (Ellis, 2000; Stuart and Sorenson, 2003), discovering prospects for global markets (Aldrich, 1999; Aldrich and Zimmer, 1986; Ellis, 2000; Ellis and Precotich, 2001; Harris and Wheeler, 2005), facilitating the creation and growth of ventures (Davidsson and Honig, 2003; Jack and Anderson 2002), as well as assessing possible strategic alliances (Ellis, 2000). Finally, Kiss et al. (2008) demonstrated a clear, significant impact of strong and weak social links on the pace of internationalization of new ventures.

3.3.4.2. Liabilities

In contrast to the enabling factors of internationalization discussed previously, it is contended that entrepreneurs also face multiple constraints that threaten their international expansion (e.g., Oviatt and McDougall, 1994). In general, academics of International Business claim, that foreign corporations may face a different collection of costs than domestic businesses (Eden and Miller, 2004). Sometimes these costs stem from disparities in culture, language, education, corporate practices, or political structures (Sousa and Bradley, 2005). The most significant challenges, or liabilities, are presented in the following.

The "liability of foreignness" and the "liability of outsidership" are two assertions specifically connected in this area to the internationalization efforts of companies. Kindleberger (1969) and Hymer (1976) initially introduced liability of foreignness, and Zaheer (1995) later described it as "all additional costs a firm operating in a market overseas incurs that a local firm would not incur" (Zaheer, 1995, p. 343). The researcher identifies four rationales why such extra costs may be incurred. These are (1) the direct costs of travelling, shipping, or organizing through time zones, (2) the costs related to the company's relative inexperience in a foreign world, (3) the costs incurred as a result of economic patriotism in the foreign sector, and (4) the costs inflicted by the domestic government in the course of export restrictions. Therefore, in order to remain competitive with local businesses, companies need to be prepared with company-specific incentives that help mitigate foreignness liability and other costs associated with conducting trade in the overseas market.

The liability of outsidership primary identifies challenges towards internationalization from the perspective of networks. Johanson and Vahlne revised their original stage internationalization model in 2009 and highlighted the critical significance of networks. The researchers define markets as "networks of relationships in which firms are linked to each other in various, complex and, to a considerable extent, invisible patterns" (Johanson and Vahlne, 2009, p. 1411) and deduce that insidership is an important component of effective internationalization of ventures. It is crucial to gain approval from its members if companies are to become successfully internationalized in appropriate positions within the network in order to overcome liability for outsidership. The same empirical paper shows that networks are a precious repository of learning by means of relationship interactions. Following the same logic, new ventures would first aim to develop relationships within a market with established businesses, and then use these connections to build new expertise.

The liability of newness along with the liability of smallness would be addressed herein. Although these concepts are not explicitly connected to the process of internationalization, they demonstrate particular concerns involving emerging enterprises and small businesses. Initiated by Stinchcombe (1965), the liability of newness was the first proposition that sought to describe the challenge of young

business' sustenance in the midst of mature organizations. Stinchcombe has become the first researcher to examine the negative scenario, while most research of the period concentrated on the emergence of new businesses (Bonazzi, 2008). The definition offers, in theory, a justification for the high mortality rates experienced by businesses in their early years. The researcher claims that emerging businesses face a deficit of expertise and hence go through a cycle of ineffectiveness, high time costs, tension, and concern (Stinchcombe, 1965). This stage of transient inefficiency could be utilized by surviving companies to establish routines and best practices (Hodgson and Knudsen, 2004; Nelson and Winter, 1982). The principle of liability of newness specifically discusses the crucial function of trust. On one hand, in order to establish well-functioning associations with the surrounding environment, i.e., vendors, consumers as well as regulatory agencies, trust is mandated. Unless stable alliances and structured relationships between all players have been formed, mortality rates for the ventures in concern remain elevated. Trust, on the other hand, often plays a significant role in the ability to function of the workforce from an internal viewpoint. Collective action can only be invoked if trust is generated amongst employees of an organization. As a result, internal tensions will be minimized, and organizational capacity will be improved. In addition, literature on liability of newness suggest that these early stages are marked by the quest for acquiring a reasonable degree of credibility by the population (e.g., Singh et al., 1986; Wievel and Hunter, 1985). Stinchcombe's (1965) study was of considerable importance and as defined by Abatecola et al. (2012), provided the foundation for many other definitions of liability (e.g., liability of smallness and liability of adolescence).

Finally, the role of an organization 's size was examined by Aldrich and Auster (1986) and liability of smallness was formulated accordingly. This definition relates to (1) a shortage of financial capital, (2) the complexity of recruiting an extremely competent workforce, and/or (3) the uncertainty of maintaining high interest rates and organizational regulatory costs as a result of the limited size of a company. Many studies have demonstrated the theory's applicability throughout many industry sectors (e.g., Baum and Mezias, 1992; Baum and Oliver, 1991; Delacroix and Swaminathan, 1991; Wholey et al., 1992). Despite the apparent parallels with the liability of newness, however it is not possible to consider the liability of smallness as a direct substitute, rather, it could be viewed as a complementary principle.

Scientific literature discusses many additional liabilities that businesses can encounter, but their significance is less important to this research at hand. One instance is known as the liability of adolescence which is centered on the liability of newness (Stinchcombe, 1965). In comparison to previously discussed conceptions, the researchers (Fichman and Levinthal, 1991; Kale and Arditi, 1998) suggest a contrasting viewpoint on the liability of adolescence. It is asserted here that businesses endow "an initial stock of assets, which (depending on the particular context) can include favorable prior beliefs, trust, goodwill, financial resources, or psychological commitment" (Fichman and Levinthal, 1991, p.442). The stronger the partnership or organization's initial assets, the significantly larger the buffering of premature selective pressures (Fichman and Levinthal, 1991, p. 448). Whenever this initial buffering period (i.e., the honeymoon stage) elapses, clear relationship disparities become evident. These contradictions often contribute to the rapid "death" of a business. However, those businesses that can endure the challenge and use the chance to transform processes and establish stronger partnerships will then face a greater probability of success and longevity (England and Farkas, 1986). In summary, liability of adolescence emphasizes on the advanced phases (i.e., the post-honeymoon phase) of a startup's lifecycle. Having mentioned that, as this thesis mainly focuses on the formation / seeding stage of startups, the concept of liability of adolescence becomes obsolete and would therefore be omitted moving forward.

3.3.5. Concluding remarks

Initially, this subchapter analyzed the conventional literature on internationalization and outlined the advancement from an economic viewpoint over a behavioral one to a network standpoint. The literature review found that concepts subscribing to these study streams could not justify the internationalization actions of increasingly internationalizing companies such as Born Globals or International New Ventures. Inherently close in essence and terminology are these new types of firms, but the Born Global reveals a greater particularity for accelerated internationalization. In addition, this subchapter addressed drivers and obstacles encountered by new ventures with respect to their attempts at internationalization. The startup's industry, its location and also the attributes of its founders and management team were noteworthy factors. In addition, the role of networks as a facilitating force for the internationalization of new ventures was particularly emphasized in this subchapter. In comparison to the facilitators of internationalization, the inhibiting variables faced by startups were reflected in the liability's nomenclature. It highlighted the liability of foreignness (i.e., the effect of comparatively higher costs comparison to domestic players), the liability of outsidership (i.e., the absence of a valid network stance), newness liability (i.e., elevated mortality patterns in formative days due to temporary inefficiencies) and the liability of smallness where the importance of company size was highlighted in conjunction to the recruitment of good workforce, favorable credit terms and acquisition of funding.

3.4. New high-tech ventures, internationalization, and lean startup methodology (LSM)

Up until now, the research has dealt with the concepts of LSM and internationalization disjointly. The objective of this section is to consolidate or assimilate both the concepts taking into account the main subject matter, i.e., newly established technology-oriented firms and how they can be arranged within the boundaries of diverse internationalization theories and LSM. In pursuance of this, firstly the high-tech startups needs to be classified either under the taxonomy of Born Globals or Internationational New Ventures (INVs). This comparison is made because existing literature on purely new high-tech ventures or synonymously newly established technology-oriented firms and its guidance to internationalization under the lean startup methodology is sparse. This means that in further subsections, it will be further discussed, whether the theoretical backings of Born Globals or INVs can act as a model of comparable.

3.4.1. Categorization of new high-tech ventures within the spectrum of Born Globals and International New Ventures

In subsection behavioral rationale to internationalization, the Uppsala Model was introduced where the concept of so called "establishment chain" was discussed. Based upon this notion of gradual internationalization process, i.e., entering geographically and culturally closer markets with low-risk market-entry modes, such as "export", "licensing" or "franchising" in collaboration with a local partner, Johanson and Vahlne (2009), state that the Uppsala Model can also be extended to companies that start internationalizing briefly after they are established, implying the born global firm characteristics, mainly due to the fact that these businesses tend to choose international markets where they can enter rapidly and utilizing forms of low-risk and low-cost market entry mechanisms, for instance, exporting (Neubert, 2017). These two practices (i.e., market and mode selection) could be seen as the initial steps in the Uppsala model's development chain (Johanson & Vahlne, 2009; Neubert, 2017).

In the context of born-global businesses, most academic research on early and rapid internationalization centers on new high-tech ventures (Neubert, 2017; Servantie et al., 2016). The born global is a young company that is functional via early export sales (Cavusgil & Knight, 2015; Knight & Liesch, 2016; Neubert, 2017). The born-global framework therefore focuses on a market-

seeking internationalization method that incorporates, for instance –, a global exporter internationalization model (Neubert, 2013). This is indeed the linkage with the chain of establishment of the Uppsala internationalization process model (Johanson & Vahlne, 2009; Neubert, 2017). Both principles concentrate on the "export" market entry strategy as the initial step towards exploring a new international market. Furthermore, the term "global" in "born global" ought not be perceived in the context that a born global firm delivers instantly to every international markets. Typically, a born global business begins to sell to a tiny minority of the most lucrative markets or to a specific zone, perhaps with a free trade area (Coviello, 2015; Neubert, 2017).

A born-global business differs fundamentally from an international new venture. From the perspective in conjunction to the notion of international new ventures, they "encompass both young, internationalizing firms, and new ventures launched in older, established multinationals" (Neubert, 2017; Tanev et al., 2015, p. 4). They utilize all the international supply chain operations, including not just export but also takes into account offshoring, outsourcing, R&D, production, sourcing, and other entry strategies such as foreign direct investment. Therefore, the concepts of born globals and the international new ventures should not be used interchangeably (Coviello, 2015; Neubert, 2017). The newly established technology-oriented firms evaluated in this thesis relies (in their existing phase of development) on market-pursuing internationalization practices through leveraging as to a great extent "export" as the primary form of penetrating international markets in collaboration through local distribution companies and their platforms in order to create market openings and to gain customers. Thus, the scarcity of theoretical underpinnings of new high-tech ventures and its association to LS and internationalization's success will henceforth be compensated by the terminology of Born Globals as a comparable or utilized synonymously.

3.4.2. Characteristics of new high-tech ventures / Born Globals and early internationalization
According to a thorough assessment of the related research, the defining features of BG companies are as follows (Tanev, 2012; Tanev et al., 2015). First, BG companies are distinguished by a greater extent of operation in foreign markets from or reasonably close to its inception. The firm's decision to participate in a systemic internationalization process is typically decided by its nature—the form of technologies that is being introduced or the company's expertise in the particular business, supply chain or consumer sectors (Jones et al., 2011; Tanev et al., 2015). Furthermore, on the other hand, the severity to which a company is "born global" instead of "born local" or "late global" rests on the business's internal decisions and actions (Moen and Servais, 2002; Tanev et al., 2015). At the start of business, the aspiration of the founder is a crucial driver for early internationalization tendencies for the firm (Gabrielsson and Pelkonen, 2008; Tanev et al., 2015). Second, BG companies appear to be comparatively small and have much less monetary, human, and physical capital than big multinationals that have been deemed influential in international commerce and investment. Third, many BG firms are high-tech businesses, but the BG movement has expanded even beyond the technology market (Moen and Servais, 2002; Tanev et al., 2015).

Fourth, BG companies involve leaders with a clear international perspective and an international entrepreneurial intention. The abilities of the management teams have been described as very necessary for enabling more intensive internationalization, especially in the knowledge-based high-tech sectors (Andersson and Evangelista, 2006; Johnson, 2004; Loane et al., 2007; Tanev et al., 2015). Sixth, BG firms are often at the leading technological edge of their industry or of their product category (Tanev et al., 2015). Fifth, BG companies prefer to follow differentiation tactics based on innovative concepts and extremely differentiated high-tech goods addressing market niches, which might just be too small to suit the preferences of larger firms (Cavusgil and Knight, 2009; Tanev et al., 2015). Sixthly, BG companies are always at the industry's leading technical forefront or of their

product segment and aspires not to serve the commodity markets (Cavusgil and Knight, 2009; Tanev et al., 2015). Seventh, the majority BG companies are expanding globally by participating in direct foreign sales or employing the tools of autonomous intermediaries headquartered overseas (Cavusgil and Knight, 2009; Tanev et al., 2015). Most frequently, these companies' partner with multinational corporations (MNCs) by leveraging their current platforms, networks, and internet resources to produce large sales and cash flow easily (Gabrielsson and Kirpalani, 2004; Tanev et al., 2015; Vapola et al., 2008).

Finally, recent reports have stressed that early internationalization of BG companies and similar new high-tech ventures can be viewed as an innovation phase in and of itself, and that high-tech innovation and internationalization have a positive influence upon one another. Therefore, BG companies can be seen as having a special capacity to innovate and internationalize quickly by perfecting specialized information acquisition and networking skills as essential innovation facilitators (Rasmussen & Tanev, 2015; Zijdemans and Tanev, 2014).

While the BG phenomena is not exclusive to the technology industry, numerous BG businesses tend to be technology-driven enterprises. A recent research report outlined a range of requirements for newly developed technology firms to be eligible for early or accelerated globalization (Kudina et al., 2008; Tanev et al., 2015):

1. Functioning in a knowledge-intensive or high-tech field.
2. The home country market is not significant enough to accommodate the size at which the business desire to compete.
3. Many of the prospective consumers are international, multinational corporations.
4. The strategic edge is centered on the most technically sophisticated offering in the world.
5. There are very few trade restrictions in the goods or service segment.
6. The significant advantage of the good or service is greater than the expense of transport/logistics.
7. Customer expectations and preferences are relatively common in the foreign markets of the organization.
8. There is a major first-mover advantage or network influence in conjunction to the goods or services.
9. The main rivals have either internationalized or are about to internationalize.
10. Managers with prior experience in the growth of international business (IB).

In accordance with the above, researchers have established an additional organizational propensity that facilitates internationalization and strengthens the international success of BG companies, i.e., the capacity to exploit various forms of networks or ecosystems (Kudina et al., 2008; Rasmussen & Tanev, 2015). Kudina et al. (2008) related the prosperity of technology-based BG firms to the optimal use of ecosystems consisting of: academic institutions and businesses working in the same sector as pivotal firms helping to deliver a stream of technical information, skilled people and connections with local investment firms; foreign sales affiliates offering valuable repositories of specialist information from experts which are distributed globally and promoting mutual communication between engineers and customers with a view to specifying customer demands in such a way as to provide a pathway for attracting additional business; international sales branches and domestic customers who have an impact on the production of elevated services on the premise of technical expertise accumulated through customers or their business associates (Rasmussen & Tanev, 2015).

4. Conceptual framework and hypothesis development

After having elaborated upon the theoretical background of the lean startup method, along with its arrangement in internationalization literature, this research's next step is to explore how the different dimensions of LSM can have a facilitating effect on the internationalization's success of new high-tech ventures. Despite the fact that research to the lean startup method within high-tech ventures is very limited, existing studies recognized the importance of several fundamental elements of the method that together define Lean Startup Methodology (LSM). Furthermore, the reciprocation of these factors could affect the outcome of a lean startup undertaking. The next paragraphs will describe the potential factors that combined may contribute to the success of lean startups in an innovation process, within the context of internationalization.

Recently, some researchers begun to describe the nature of the Lean Startup Approach, which aided in defining the elements to Lean Startups conceptualization. The aim was to define and understand key components of the lean startup strategy and to derive scientific support for its components (Frederiksen & Brem, 2017). The qualitative phenomenological study undertaken by Patz (2013) disclosed 25 constructs linked to lean startups, with lean startup practitioners such as Eric Ries, Ash Maurya, Alexander Osterwalder, and six international entrepreneurs.

Patz (2013) in his research reiterated the fact that the "Lean Startup phenomenon is seen as a process consisting of problem understanding, solution definition, qualitative validation and finally quantitative validation." (Patz. 2013, p. 29) and referred it as comparable to the "Build-Measure-Learn (BML)" loop. Schwery (2018) took this BML loop as the basis for further conceptualization of the Lean Startup Methodology. His line of reasoning is elucidated next. This research has already established the notion that startups operate under extreme harsh conditions, for instance, the lack of a validated business model, time scarcity, market, and technology uncertainty.

In the lean startup book, Ries (2011) accentuated the "BML" loop with the promise to reduce production cycles by utilizing the concepts of hypothesis testing, substantiated learning, and iterative product development processes. Hypothesis checking, quick prototyping, validated learning, strong customer focus, iterative customer feedback and exploration are methods intended to minimize business volatility, technical uncertainty, and the uncertainty of new venture management in the potential growth process (Ries, 2011). The core features of the lean startup process is thus found in the BML Feedback Loop. Schwery (2018) designed and built the overarching core elements (refer to tab. 3) of the Lean Startup Methodology upon this foundation of the BML loop and extended it with the findings of Osterwalder and Eisenmann et al.

Osterwalder (2017), disapproves the Build, Measure, Learn cycle given the fact many entrepreneurs takes the step "Build" too literally and hastens to already start building prototypes. He emphasizes the addition of step 0, i.e., Think (& Hypothesize) which should help the entrepreneurs in help shaping their idea into an attractive customer value proposition. This literally translates into crystallizing the idea by defining the most critical assumptions and hypotheses underlying it. The same notion was found in another study conducted by Eisenmann et al. (2013) where hypothesis-driven entrepreneurship approaches were explored. In their study, setting the vision (ideation) was considered the first step where an entrepreneur must have a vision (and orientation) for the customer problem that his startup will address and potential solution for the problem mitigation. This is in line with Osterwalder (2017).

Table 1: Overarching constructs of Lean Startup Methodology (adapted from Schwery, 2018)

Ideation	Build	Measure	Learn

After having constituted the overarching concepts of the Lean Startup Methodology, this research now shifts focus to the underlying constructs, concepts which further defines the Ideation-Build-Measure-Learn loop. For comprising the first-order constructs, Patz (2013) developed a model (refer to fig. 10) after open and axial coding the qualitative interviews. 146 individual codes were coded, which was then transformed into six higher-level activities / precepts. Iteration, experimentation, characteristics (customer orientation), validation, learning, and prototyping were such concepts. Since the role of the team also emerged as a Co-Occurence theme in the phenomenological analysis, and since some prior lean startup studies highlighted the sharing of information in teams (Harms, 2015), transfer of knowledge was included in the list of activities (Harms & Schwery, 2019).
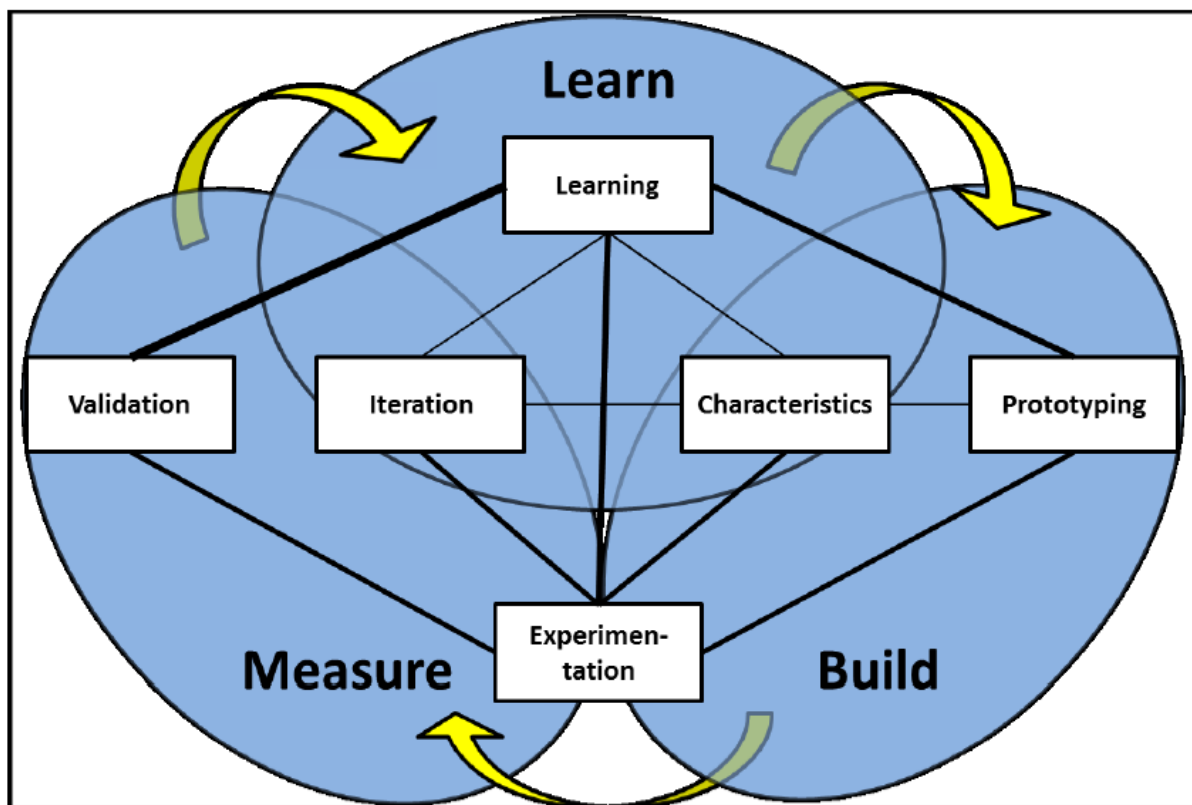
Figure 10: Results of the phenomenological study conducted by Patz (2013) depicting the higher-level constructs

In addition to that, another recent empirical study presented by Rübling (2016), who transpired to establish a valid measure for a systematic analysis in conjunction to the propagation of a theoretical conceptualization of lean startup methodology and to measure the "degree of leanness", proposed three LSM dimensions, based on his definition "LSM is a customer-oriented, hypothesis driven approach to iteratively develop and evaluate an entrepreneurial opportunity" (Rübling, 2016, p. 5). These dimensions were: customer validation, iterative development, and progress tracking.

Customer validation is based on the "Validated Learning" theory which suggests that companies should sketch the core elements of their organization as a first step and determine all the main assumptions on which it relies upon (Rübling, 2016). Next in direct contact with prospective clients, these hypotheses need confirmation (Rübling, 2016). Looking carefully at the main essence of what Rübling (2016) mentioned is in close synchronization with what Osterwalder (2017) and Eisenmann et al. (2013) characterized in conjunction to phases "Think" and "Ideation - hypothesis-driven

entrepreneurship" respectively. Also, it is comparable to Patz's (2013) "customer orientation" construct.

Next the "Iterative Method" corresponds to the first dimension i.e., "Iterative Development", which is associated with the concept of 'Build-Measure-Learn' in Ries' original publication and outlines a sequence of steps for conducting continuous experiments (Rübling, 2016). Based on previously established assumptions, the respective characteristics of the good or service are evaluated against the pre - specified objective with the least number of capital / resources available (Rübling, 2016). Entrepreneurs ascertain from consumer responses whether certain assumption can be verified or whether the elements originally drawn up need adaptation. The applicability of experimentation in grappling with situations of high complexity and uncertainty has been shown consistently in the publications on entrepreneurship (Andries, Debackere, & van Looy, 2013; Kerr, Nanda, & Rhodes-Kropf, 2014; Lynn, Morone, & Paulson, 1996, Rübling, 2016). This is a direct indication this construct is conceptualized upon Ries' top-level concept of "Build" and also coherent to Patz' (2013) "experimentation" and "prototyping" definitions. It also corresponds to Patz's concept for "learning" and "iteration" due to the fact the notion of continuous experimentation is an iterative process and iteration results in learning given the processes of trial-and-error learning.

Progress Monitoring represents a particular method that enables progress to be tracked while under uncertain conditions. Rather than using traditional management accounting metrics such as sales growth or profitability, LSM recommends defining growth and value factors from the initial business vision (Rübling, 2016). Proper performance metrics are integral to the understanding and measurement of trial experimental outcomes. Rübling further emphasized the importance of it by saying "how can entrepreneurs be positive about having correctly identified customer value if the outcome of an experiment is judged upon gut feeling instead of observable indicators?" (Rübling, 2016, p. 8). This analogous to the "validation" concept of Patz (2013) and also to some extent comparable to "knowledge transfer" in teams by Harms (2015).

After having outlined all the factors in the preceding paragraphs, it has now become quite evident that the underlying constructs of the overarching concepts of the Lean Startup Methodology overlap with each other by a great margin and in almost all dimensions, especially in the studies of Eisenmann et al. (2013), Patz (2013), Ries (2011) and Rübling (2016). Given this reoccurring and intersecting comparability, the underlying constructs (refer to table 4) is proposed next inspired by the works of Schwery (2018) and takes into consideration the works of other scholars as suggested above:

Table 2: Overarching and underlying constructs of Lean Startup Methodology (adapted from Schwery, 2018)

Ideation	Build	Measure	Learn
Customer orientation	*Experimentation*	*Validation*	*Learning*
Hypothesis testing	*Prototyping*	*Knowledge transfer*	*Iteration*

Table 5, which is introduced next entails a synopsis of the past academic papers where it discussed overarching concepts of the Lean Startup Methodology in detail:

Table 3: LSM in past academic papers

	Ideation	Build	Measure	Learn
Frederikson & Brem, 2016	User and customer involvement in both product and business development (p. 7): open innovation (Chesbrough et al., 2006) & co-creation (Huizingh, 2011)	Experimentation in NPD: experimenting as an effective means to achieve firm survival (Lynn et al., 2003)	Milestones as a guiding tool for validation of assumptions (Block & MacMillan, 1985)	Iterative NPD with user feedback (Sandmeier et al. (2010): Sequential development (Salerno et al., 2015, Becker et al. 2015), Learning cycle (Thomke, 1998)
Patz, 2013	Characteristics (customer orientation), assumptions & defining hypotheses	Experimentation, prototyping, characteristics	Experimentation, validation & iteration	Leaning, iteration, characteristics
Harms, 2015			Knowledge transfer in teams	
Eisenmann et al. (2013)	Set vision, translate vision into falsifiable hypotheses	Specify MVP tests, prioritize tests (low cost / high value tests first & consider parallel testing)	Outcome of hypotheses testing	Learn from MVP tests: false positive vs. false negative, cognitive biases; Consider possibilities to persevere, pivot or perish
Shepherd & Gruber, 2020	Finding & prioritizing opportunities	Building MVP & designing business models	Measuring outcomes of business model innovation	Validated learning (opportunity conjectures & entrepreneurial search, empathy, and disciplined imagination)

Upon having determined both the overarching and the underlying concepts, the upcoming sections will scientifically characterize in detail the theoretical tenets of the (eight) underlying concepts in order to facilitate the operational definition.

4.1. Ideation: Hypothesis Testing and Customer Orientation
4.1.1. Hypothesis testing
The definition of hypotheses in research efforts is based on systematic statistical inference. Structured and rational methods are formal frameworks for hypothesis testing. The nature of the testing of hypotheses is associated with how one determines whether there is any match between what we fundamentally assume is true and what the proof (data) suggests is not true. Such that, is the proof good enough to refute the null hypothesis corresponding to it? Accurate decision in practice proceeds from "fact" as defined by hypothesis statements (educated guesses), hypothesis testing (evaluation), and hypothesis verification (York & Danes, 2014).

The method guided by "hypothesis testing" is the first step towards higher achievement and with that higher internationalization success as this drastically reduces both market and technology uncertainty in conjunction to business model viability of local and foreign markets contexts. It is believed that the lean startup approach adds the rigor of scientific methodology to innovation's unpredictable nature (Ries, 2011, Schwery, 2018). As already discussed, startups are nascent companies set up by entrepreneurs to introduce new goods and services. Usually, the creators of a startup face considerable resource limitations and substantial doubt about the feasibility of their prospective business model and this is further heightened during internationalization as the founders lack experience of the unexplored territory. A hypothesis-driven approach to entrepreneurship significantly increases the depth of information obtained for overcoming such complexity, in conjunction to per unit of resource dissipated. An entrepreneur converts his or her vision into falsifiable business concept theories by adopting this strategy, and then measures such hypotheses using a set of minimum viable products (MVPs). Each MVP represents the smallest set of operations available to refute a hypothesis (Eisenmann et al., 2013).

Hypothesis-driven strategy aims to minimize the risk and with that help overcome the greatest challenge that entrepreneurs face: selling a product that no one desires, in the context of local and also global markets. Often companies struggle because their entrepreneurs spend money on developing and selling goods before having overcome the ambiguities encompassing the business model. Early-stage entrepreneurs who follow a hypothesis-driven strategy, by comparison, do not perceive growth as their primary target. Their aim instead is to learn how to create a successful and sustainable organization. The hypotheses-driven method optimizes the usage of constrained resources for startups (Eisenmann et al., 2013), by limiting uncertainty prior to international entry.

In conclusion, reasoning and constructing logical hypotheses are therefore a necessity before a scenario can be examined (Frese, 2009, Ladd, 2016) and the logic of hypothesis testing can thus be reasonably hypothesized in leading to a greater chance of internationalization success.

4.1.2. Customer orientation
In general, customer orientation can be defined as customer-oriented organizations which concentrate on identifying consumers' articulated preferences in their targeted markets and designing goods and services that fulfill those inclinations (Slater & Narver, 1998). Customer-oriented organizations usually use focus groups and customer surveys to deepen their comprehension of customer desires and perceptions of existing products and services, and to direct the creation of new products and services through strategies such as design testing and collaborative analysis (Leonard and Rayport, 1997; Slater & Narver, 1998). In order to obtain maximum insight into the needs of such customers, customer-oriented companies are able establish close relationships with important customers.

Now translating that within the lean startup framework and startup success in general, customer validation or customer orientation is predicated on the "Validated Learning" theory, which suggests

that for the initial step, entrepreneurs should outline the key components of their company and determine all the key assumptions on which it rests upon. Next with continuous involvement with prospective clients of national and international nature, these inferences require validation. In entrepreneurial literary works, this heavy emphasis on understanding and analyzing a client need is rather unusual and much more prominent in the marketing field. Here, scholars have previously argued that the secret to achieving organizational objective is to create, deliver and communicate customer value (Kotler, 2000; Rübling, 2016). Nonetheless, evidence can be found for the interchangeability of the marketing ideas and its client orientation to the notion of entrepreneurship. Two works are listed exemplarily. Firstly, in a study conducted by Brettel et al. in 2009, they were successful in proving a positive success ramification of customer orientation within the entrepreneurial framework (Brettel et al. 2009; Kohli & Jaworski, 1990; Rübling, 2016). They claim that recognizing consumer expectations enables new businesses to define goods or services that are genuinely applicable to prospective end-users (Rübling, 2016). In addition to that, the beneficial effects of incorporating market orientation into the entrepreneurial process have been shown by Webb et al. (2011) (Rübling, 2016; Shane, 2003). On a theoretical level, they have demonstrated how a more realistic picture of customers facilitates the identification and creation of opportunities (Rübling, 2016). It can therefore be inferred that "customer orientation" is a necessary prerequisite for achieving company-wide success (Rübling, 2016).

This process is not inherently different when it comes to internationalizing. Once the entrepreneurs have determined a product-market fit for the local market, these courses of actions can be replicated for the international market of choice in order to determine an international product – market (customer) fit. If the relationship is not clearly determined, the beneficial aspect of the Lean Startup Approach is the practicability to pivot. Ries (2011) defines the pivot as a systematic course correction intended to test a new conceptual assumption about the product, approach, and growth engine. The notion behind a pivot is to understand that the original expectations on some aspect of the business plan / product-customer fit are incorrect, which helps in the prevention of wasting excess money by taking the enterprise in the wrong direction (Blank & Dorf, 2012; Rasmussen & Tanev, 2016). On the grounds of the above-mentioned assumptions, it can be inferred that the customer orientation subconstruct is equally important under the context of internationalization and will to lead to success.

4.2. Build – Experimentation and Prototyping
4.2.1. Experimentation
Experimentation can be defined as a process of testing hypotheses in order to gain information and reduce uncertainty simultaneously. A direct byproduct of the entrepreneurial process during the development of a successful business model is the context of severe ambiguity over whether a specific technology, product or business strategy can succeed or not. As Knight (1921) emphasized, this uncertainty represents a departure from risk (Kerr, Nanda & Rhodes-Kropf, 2014). On one hand, one may determine exact probabilities and expected values with risk, but on the other hand, these probabilities are not known taking Knightian uncertainty into account, and even the type of potential results are unspecified (Kerr, Nanda & Rhodes-Kropf, 2014). Given this encompassment of immense uncertainty, experimentation allows startups to analyze and monetize ventures without spending a fortune. Experimentation provides more than a prospect for improved returns - it also encourages startups to undertake ventures that cannot be executed at all or none (Kerr, Nanda & Rhodes-Kropf, 2014).

In entrepreneurship literature, the feasibility of experimentation to cope with uncertain circumstances has been demonstrated repeatedly (Andries, Debackere, & van Looy, 2013; Kerr, Nanda, & Rhodes-Kropf, 2014; Lynn, Morone, & Paulson, 1996). Since a well-managed experiment requires very little resources in comparison to the entire process of making a product, service or perhaps even a business,

it enables presuppositions to be tested in highly unpredictable environments (Ott, Eisenhardt, & Bingham, 2017, Rübling, 2016), which is further intensified in an international context. The research of Autio (2017) showed that trying out a variety of approaches through experimentation boosts value propositions and elevates the startups' standing in international marketplaces. According to the work of Thai and Chong (2013), small-scale experimentations were suggested to have a facilitating effect on the internationalization strategies for small businesses. In organizational learning literature, the tactic to trial-and-error learning (or in other words experimentation) typically follows fairly similar measures to those mentioned within the lean startup framework (Rübling, 2016). Van de Ven and Polley (1992) indicates that, this feedback loop is consistently followed by the following steps: people take action; there is certain response from the environment; people perceive and assess the response; and then adjust their mode of operation in order to enhance the likelihood for the preferred response (Rübling, 2016). It can therefore be inferred that both the experimentation tool and the experimental phase help the handling of turbulent conditions, mitigating the uncertainties additionally aggravated during the internationalization context. Therefore, it can be considered as an important feature of the entire lean startup system facilitating the internationalization success propensity.

4.2.2. Prototyping

First and foremost, prototyping can be defined as a materialized form of one's visualized concept, which is used to make an intangible insights, ideas, and concepts tangible, sharable and understandable to different stakeholders, both national and international (Brown, 2008; Calabretta & Kleinsmann, 2017, Luchs, Swan & Griffin, 2015). In prior research the concept of prototyping or the utilization of prototypes can be traced back to the concept of experimental learning. This mechanism is explained next in order to clarify the how the usage of prototypes is positioned within the experimental learning context and with that its performance implications. Experimental learning takes place in monitored environments which companies utilize to evaluate causal assumptions and generate new knowledge (Bingham & Davis, 2012). According to Bingham & Davis (2012), researchers argue that businesses intentionally differ inputs offline in comparative contexts (i.e., assessment of the capability of a product with various integrated technical features) and then track results closely to allocate results to inputs appropriately (Thomke, 2003). Thus, variations are designed and purposely implemented in experimental learning to provide insights into the relationship between input and output (Bingham & Davis, 2012). Evidence suggests that experimental learning mostly depends on one central aspect (Bingham & Davis, 2012). It includes reasonably low-cost measures, i.e., the usage of cost-effective and easy-to-modify prototypes to evaluate various product sizes, colors, or packaging materials to help develop more functional designs and approaches and facilitate in curbing potential downstream risks (Bingham & Davis, 2012; Brown & Eisenhardt, 1997; Thomke, 2003). Therefore, companies may use a wide range of prototypes to learn without fear of paralyzing flaws or financial excess.

In tandem to this term, Buchenau & Suri (2000) coined the definition as "experience prototyping" and defines it as "the experiential aspect of whatever representations are needed to successfully (re)live or convey an experience with a product, space or system (p. 424). They identified three different kinds of activities within the design and development process where "experience prototyping" could be valuable. It could play a crucial role in the (1) apprehension of existing user experiences and context; (2) exploration and assessment of design ideas for both domestic and international end customers and (3) communication of ideas to a particular set of audience.

In the conjecture of lean startup methodology, a prototype is the first iteration of a product, what Ries (2011), deems as the "minimal viable product". This is a necessary condition to meet for the purpose of hypothesis testing via experimentation (Shepherd & Gruber, 2020). For entrepreneurs, the concern is about how much time, energy, and other resources they could spend in developing this product

(prototype) for the testing of hypotheses (Shepherd & Gruber, 2020). The lean startup viewpoint suggests a response in form of creating an MVP via prototyping a product version that enables a full transformation of the building-measuring-learning loop with a minimal amount of commitment and a limited amount of time needed for development (Ries, 2011; Shepherd & Gruber, 2020). Therefore, the MVP (interchangeably a prototype) would include only the essential aspects of the planned product and is designed to easily validate a particular hypothesis (Blank, 2013), since under circumstances of high complexity, notably in international marketplace, no amount of design can predict the multiple complications of introducing the product to existence in the physical world (Ries, 2011; Shepherd & Gruber, 2020). The goal of the MVP is to understand and evaluate the assumptions (as hypotheses) shaping the business model of the startup (Blank & Dorf, 2012; Shepherd & Gruber, 2020). As a result, the certain modifications applied to the MVP which do not lead to learning are perceived to be a waste of money. While there are a few problems with developing and using the MVP for hypotheses evaluation, for instances, regulatory questions, antitrust concerns, and moral effects (Ries, 2011), the central proposition is that the construction of MVPs via methods of prototyping are vital to venturing success (Shepherd & Gruber, 2020). Thus, it can also be reasonably theorized to achieve the same degree of success under the international context, given its universal applicability.

4.3. Measure – Validation and Knowledge Transfer
4.3.1. Validation and knowledge transfer

Validation can be defined as the usage of information, based on the effects of iterative tests, in order to track the effect of decisions. These insights can help entrepreneurs to balance out biases in individual decision-making (Eisenmann et al., 2011; Harms & Schwery, 2019; York & Danes, 2014). Validation thus lets entrepreneurs obtain a more realistic image of the organization (Harms & Schwery, 2019). These claims correspond to the evidence-based management literature of Rousseau (2006). Evidence-based management involves turning concepts into corporate strategies based on the best evidence (Rousseau, 2006). Via evidence-based leadership, entrepreneurs grow into expert professionals who make social science and organizational research-informed organizational decisions, a part of the zeitgeist, shifting professional considerations apart from personal inclination and unsystematic practice towards those based on reliable and validated empirical evidence (Barlow, 2004; DeAngelis, 2005; Champagne & Lemieux-Charles, 2004; Rousseau, 2006; Walshe & Rundall, 2001). This ties the decision-making of entrepreneurs to the continuously growing research framework on cause-effect principles which encompass human behavior and organizational conduct (Rousseau, 2006).

The process of validation in the entrepreneurial process has another benefit, i.e., mitigating/minimizing the level of risks during the development of products and services. From the empirical perspective of risk analysis and contribution to the lean startup, the works of Gilbert and Eyring (2010) is notable (Bortolini et al., 2018). Gilbert and Eyring (2010) found a method of selection and validation of hypotheses experiments based on the estimation of risks associated. This approach contributes greatly to the validation step of the hypothesis, providing a tool in order to determine which theory/hypothesis to validate first (Bortolini et al., 2018). Validating all core business model assumptions equates to a product market alignment, a condition marked by early adopters' requirement and profit opportunity for entrepreneurs in their value-creating proposition (Eisenmann et al., 2011; Schwery, 2018)

In entrepreneurship literature, learning and knowledge gains can be considered directly proportional to each other. Kirzner describes entrepreneurial knowledge as an uncommon, abstruse type of knowledge, knowledge of where information (or other resources) can be accessed and how it can be deployed (Kirzner, 1979). Knowledge, then becomes the alertness which contributes to the exploration of possibilities (Minniti & Bygrave, 2001). The entrepreneur had not originally known about the

opportunity he was acting on. It would have already been acquired if he or anyone else had noticed about it. But the alertness of the entrepreneur contributes to doing something originally unforeseen, i.e., the revelation of a different way of doing things. This process of discovery enhances the knowledge of the entrepreneur, and it really is itself a shift in the knowledge base of the entrepreneur (Minniti & Bygrave, 2001).

Actions that arise from the recent conception cause more changes in the knowledge of the entrepreneur. Therefore, entrepreneurship is a learning process, and a definition of entrepreneurship involves a learning theory (Minniti & Bygrave, 2001). Whatever was learned can of course, be wrong. Entrepreneurs will struggle. Yet entrepreneurs (like all people) learn from mistakes as well. Every other entrepreneur assembles past interactions in an information set that defines his intellectual capital at any moment in time (Minniti & Bygrave, 2001). The stock of knowledge of an entrepreneur is influenced by his subjective contexts and his preferences decide which components of his knowledge are important to him and his objectives. So, any entrepreneurial activity over time will change the contents of the knowledge of the entrepreneur in certain areas (Minniti & Bygrave, 2001). Clearly, the activities of an entrepreneur are not autonomous of one another, so learning is a procedure that includes iteration and exploration which improves the confidence of the entrepreneur in certain activities and enhances the substance of his knowledge inventory (Minniti & Bygrave, 2001).

The path-dependent trajectory of knowledge and probability of failing both suggest that any reasonable entrepreneurial behavior model would have to deviate from the traditional rational expectation behavior presumed by conventional neoclassical economic principles (Bullard, 1994; Frydman, 1982; Minniti & Bygrave, 2001). Neoclassical philosophies of industrial organization (e.g., Tirole, 1989) often really have nothing to suggest, over how entrepreneurial knowledge is gained and also how entrepreneurs modify and improve their knowledge management (Minniti & Bygrave, 2001). That is because conventional approaches to economic activity in production functions only define a technical association amongst inputs and outputs. No role for entrepreneurial alertness appears to exist in such an arrangement. As a consequence, major advances in the comprehension of entrepreneurship and more broadly, of organizations will come from the examination of how entrepreneurs acquire and upgrade knowledge (Minniti & Bygrave, 2001).

One way of updating entrepreneurial learning or knowledge is by the means authenticating and validating the initial hypothesis/hypotheses the entrepreneur had. After having obtained new knowledge through the validation of hypothesis/hypotheses, the focus needs to be in the dissemination and integration of knowledge in order to support decision making for additional optimization of product and service attributes. Data validation identifies whether it is possible to continue the current strategy or whether a new path is required, which is attributed to as "pivoting". The effect of a pivot might imply taking into consideration different consumer segments, concentrating on a particular feature, modifying the pricing model, or even switching to other technologies (Blank, 2006; Osterwalder & Pigneur, 2010; Patz, 2013; Ries, 2011).

It was mentioned in the previous subsection (i.e., subsection 3), that lean startups operate in the anticipation of establishing a viable business model. Given this context and provided the importance of a global supply chain while internationalizing, "an important development in the relationship between supply chains and business models concerns drastic changes in business activities as a result of increasing globalization" (von Delft et al., 2019, p. 2). When a shift in organizations and geographies are achieved, a new observation with regards to new underlying reality of supply chains can be gained (von Delft et al., 2019). This implies that the surge of global supply chain providers gives rise to more intriguing knowledge which can then be validated as forms of hypothesis confirmation and dispersed within the internal barriers of the firm as a form of knowledge transfer. In

addition to that, the findings of Camuffo et al. (2020) and Shepherd & Gruber (2020) suggests that the validation of a business assumption through hypothesis testing regarding consumer preferences rather than relying on an unreliable hunch, yields in higher performance of the startup. Their applicability can be projected back to the international context as well. So, all in all, it can be hypothesized that the validation and knowledge transfer construct of the lean startup methodology not only helps to create a viable business model, but also strengthens the success of going international.

4.4. Learn – Validated Learning & Iteration
4.4.1. Validated learning
Conventional logic suggests that entrepreneurs either prepare or storm the castle when launching their endeavor (Brinckmann et al, 2010; Harms et al., 2015). The planning school indicates that before they launch their venture, entrepreneurs can recognize and overcome uncertainties that their enterprise is met with through meticulous business planning (Blank 2013; Harms et al., 2015). This importance of business planning is disputed by the learning school. Scholars on entrepreneurial learning (Wang and Chugh 2014) claim that entrepreneurs are constantly developing their knowledge, allowing them to analyze rival action schemes in the light of reasoning and experiences (Harms et al., 2015; Harper 1999). As a result, uncertainties are recognized and addressed as they surface. This helps entrepreneurs to consider several strategic alternatives in what is also perceived as the 'affordable loss-principle' until their funds run dry (Harms et al., 2015; Maine et al. 2015). Descriptive literature on entrepreneurial learning indicates that entrepreneurs can develop their expertise and refine their original, often unclear ideas through social engagement (Gemmell et al 2012; Harms et al., 2015). Through these interactions' entrepreneurs evaluate and optimize fundamental assumptions encompassing their venturing ideas such as assumptions of unexpressed demand, assumptions regarding the feasibility of a potential solution and assumptions concerning a business proposition (Harms et al., 2015; Harper, 1999). However, these social and effective experiments are not quite specifically formulated (Gemmell et al 2012), leading to social biases, for instance, bias of social desirability, "and cognitive biases such as optimism bias, confirmation bias, the planning fallacy, and the sunk cost fallacy" (Harms et al., 2015, p. 2). The choices of entrepreneurs can therefore be based on skewed knowledge. The lean startup can be positioned more towards the learning school philosophy, which accentuates a methodological rigor, and in the process assists entrepreneurs to tackle the aforementioned biases which could slip into "ad-hoc innovation" (Eisenmann et al., 2011), while simultaneously retaining the strong versatility of the learning approach (Harms et al., 2015).

Entrepreneurial learning literature indicates that a great deal of learning in entrepreneurial environments can be deemed experiential (Cope, 2003; Mansoori, 2017; Minniti and Bygrave, 2001; Politis, 2005; Rae and Carswell, 2001). This learning process is generally perceived as a mechanism situated in various situations and contexts of entrepreneurship (Cope, 2005; Gibb, 1997; Huovinen and Tihula, 2008; Rae, 2005;) and is conceptualized as a revolving process in which entrepreneurs move from acting to reflecting and from reflecting to conceptualization between various stages of learning (Corbett, 2005; Mansoori, 2017).

In conjunction to this learning proposition, Ries (2011) suggests the validation of this approach which he coined as "validated learning". As Ries (2011) quotes in his book, "Validated learning is the process of demonstrating empirically that a team has discovered valuable truths about a startup's present and future business prospects. It is more concrete, more accurate, and faster than market forecasting or classical business planning. It is the principal antidote to the lethal problem of achieving failure: successfully executing a plan that leads nowhere." (p. 46).

The initial business model of a start-up is founded on a range of assumptions which have to be checked and confirmed (Blank, 2013; Shepherd & Gruber, 2020). From the Business Model Canvas

viewpoint, nine essential components of the start-up are susceptible to validated learning (Osterwalder & Pigneur, 2010), described by Ries (2011) as the method of empirical proof that a team has learned useful insights about the present and potential prospects of the start-up (Shepherd & Gruber, 2020). This idea is in line with the discovery-driven approach, in which McGrath and MacMillan (1995) indicated that to build successful new ventures, entrepreneurs working under conditions of high uncertainty need to turn their hypotheses into evidence (Shepherd & Gruber, 2020). Based on the fundamental logic of hypotheses testing, Blank and Dorf (2012) and Ries (2011) proposed that entrepreneurs need to specifically state their business model hypotheses and then through experiments, test these hypotheses (Shepherd & Gruber, 2020). This can be regarded as the central principle for validated learning. The research procedure of the testing of hypotheses demands that investigators (in this context entrepreneurs) be open to the concept of disconfirming their hypotheses (falsifiability), so in that case they will need to generate new hypotheses for testing (Shepherd & Gruber, 2020). Of vital significance, is the process of customer development, in which entrepreneurs analyze and test theories relevant to their business and clients (Blank, 2013; Shepherd & Gruber, 2020). Based on the hypothesis of market size (i.e., how compelling the target market opportunity is (Blank & Dorf, 2012)), learning incorporates factors such as the value proposition of the firm, customer segments, and pathways to access customers (Osterwalder & Pigneur, 2010; Shepherd & Gruber, 2020).

Focusing on the role of learning in the decision to internationalize, it is essential to revert back to the concepts of experiential & validated learning. With the help of validated learning, i.e., learnings generated by trying out an initial idea with the form of MVP and then empirically measuring it against potential customers to validate the effect, nascent firms are able to gain experiential knowledge in the domestic market. Now diverting to internationalizing, one empirical article "directly reflects on the effects of experiential domestic learning on the success determinant of internationalizing and finds that the greater the intensity of domestic learning processes (prior to foreign market entry), results in higher probabilities of success and consequent international entry successes" (De Clerq et al., 2011, p. 147). Given this research background and its relationship to LS and validated learning, it can be hypothesized that validated learning (indirectly experiential learning) is a key indicator for a firm's international success and also consequent successes, as they learn more through knowledge generated by validating empirically. Finally, this same mechanism is also directly proportional and applicable to the subconstructs of validation and knowledge transfer.

4.4.2. Iteration
The "iteration" can be interpreted as a process of outlining new concepts, constructing prototypes, and then evaluating them, to define their strengths and limitations. The concept was first used for software development and has been increasingly proposed for development purposes, with a long-standing fusion of the two terms iteration and incremental. The fundamental concept behind this approach is to build a system through repetitive "iterative loops" and in smaller incremental sections at a time, enabling product creators to take advantage of what has been learned during the development of earlier pieces or iterations of the system. Learning comes mostly from the development and through the usage of the system, where feasible main steps in the process initiate with a basic implementation of a subset of specified requirements and refining the evolving versions iteratively until the complete system is implemented. Design improvements are made, and new functional features are introduced with every iteration (Larman & Basili, 2003).

With regards to iteration given the lean startup context and performance implications, the mechanism can be comprehended synonymously to the "Build-Measure-Learn" mechanism, i.e., which enables entrepreneurs to develop and assess new products or services in an accelerated iterative manner. At its core, the Lean Startup Methodology aims to develop businesses and products in an iterative, market

feedback-based process. The lean startup methodology works by testing hypotheses by developing and launching a first version of the product/service with just barely enough features to complete the primary purpose of the product. On one hand, this capacitates the process of collecting feedback and on the other hand, it also empowers the entrepreneurs in the decision to persevere or to pivot (feedback-induced adaptions) accurately and adequately (Eisenmann et al., 2011, Schwery, 2018). Based on market feedback, i.e., on the basis of real customer feedback through interactions, these hypotheses are tested iteratively. The insight received helps the inferences to be validated or invalidated, simultaneously increasing the awareness of the concerns of consumers, as well as how the suggested fix works to address that problem. This provides the means for the next iteration to be improved and to be quickly launched. Such approach eliminates the loss of resources in the conventional product development cycle, resulting in rapid iteration and encourages startups to adapt more to consumer demands. A startup's efficiency and potential is measured by its ability to rapidly develop, construct a minimum viable product of that concept, evaluate customer acceptance of the product and market potential, and learn how to enhance (or change course) during the next iteration. At its core, it is a learning cycle or in the words of Ries (2011) a validated learning approach, which helps to run experiments and empirical validation. This is replicated iteratively several times as possible until the viability of the product market is established. The process of rapidly translating ideas into products, learning the customer's reaction to the products, and recognizing how to enhance or reshape those ideas is shown in figure 2.

In scientific literature, the "Build-Measure-Learn" loop seems to have uncanny similarities to one iterative learning framework. It is a mental model devised by Sykes & Dunham (1995), also popularly known as the Critical Assumption Planning model (CAP) as illustrated in figure 11. CAP is made up of six-steps. The accomplishment of the sixth step completes a landmark and becomes the foundation for the first step during the next cycle. This is referred to as the learning loop. As the enterprise is established, the learning loop is replicated. Completing each cycle or goal takes the venture to a new knowledge frontier. Successive loops then form a continuum, with the emphasis on a much more comprehensive knowledge of the business proposal. Exploring the entire business case across each cycle eliminates a pointless exercise on non-critical concerns. The entrepreneurial team or entrepreneurs remain attentive to what they observe and influence the business plan accordingly. According to Sykes and Dunham (1995), "the primary activity in a new venture must be learning from testing the assumptions and responding to what is learned" (p. 414) and CAP does exactly the same by introducing a learning approach for new business development.
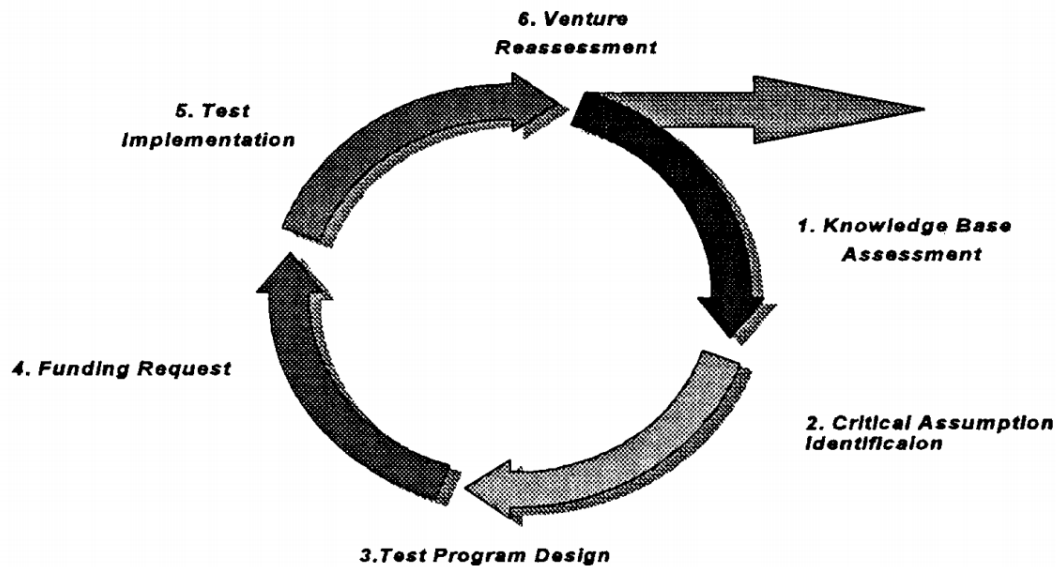
Figure 11: Six steps in critical assumption planning (Sykes & Dunham, 1995)

In order to reflect upon on how the "iteration" subconstruct of the Lean Startup Methodology leads to internationalization success, a little literary detour with regards to "International Knowledge" needs to be made. In the words of the researchers Fletcher et al. (2013), Internationalization Knowledge or in short IK represents "firm-specific organizational knowledge that requires organizational learning processes in its acquisition and transfer from country to country" (p. 47). Empirical research has verified the value of IK for effective internationalization (Erikson, Majkgârd, & Sharma, 2000; Forsgren, 2002; Prashantham and Young, 2009; Zahra, Ireland, & Hitt, 2000). By enhancing their estimation of the resources needed for growth, companies can exploit IK to build a comparative edge over domestic rivals (Almeida, Song, and Grant 2002; Knight and Liesch, 2002; Prashantham and Young, 2009; Roth et al. 2009) and gain superior foreign business performance (Barkema et al. 1996; Barkema &Vermeulen, 1998; Blomstermo et al. 2004; Delios and Beamish, 1998).

IK can be categorized into three categories, i.e., Market Entry IK, Localization IK, and International Enterprise IK. Market Entry IK is more suitable for the purpose of this argumentation and is briefly described next. Internationalization process analysis identified market entry IK as the rudimentary information needed to reach new foreign markets (Madsen and Servais, 1997), including that of the required entry modes (Prashantham &Young, 2009). In order to acquire market knowledge and intelligence in new regions, companies need to know how to perform a search for information; they need to know what type of information they are searching for, when and how they can locate it. Eriksson et al. (1997, p. 358) states that "internationalization experiential knowledge is thus procedures and routines for how to learn in local markets, and it is the antecedent to market-specific international experiential knowledge".

So, translating this back to the iterative approach of the Lean Startup Methodology, the process of iteration in the BML process leads to enhanced organizational knowledge. As mentioned in the argumentation above, i.e., the antecedent to market-specific international experiential knowledge necessitates one to acquire more knowledge of the local markets. Thus, it can be hypothesized that the iterative approach of developing and learning in tandem to customer wishes can have a positive influence on IK and this leads to the higher probability of internationalization success. One must be

asking the question, how can experiential knowledge gained through iterative development in the local market be projected for the applicability of the international market. Due to advances in digitalization, a minimum viable product can take any form, even a virtual form. For instance, crowdfunding platforms are able to obtain the money required to start commercialization of the product by uploading a mere product video. This implies, that the video upload can be considered as a type of prototyping by investing the least number of resources and its reach is both local and global in terms of customer's reaction to products. Once successful in the local market (i.e., having developed the product multiple times and establishing a viability of the product market), these clues can be used to create an MVP (physical or virtual) for the international audience in focus. The iteration of BML loop leads to enhanced IK and with that more success in the international market.

4.5 Hypothesis Development

In line with the above-mentioned rationalization and all the preceding justifications of the theories in conjunction to the different dimensions of the Lean Startup Methodology and its interplay on internationalization success, it can be hypothesized that:

HI: *Higher degrees of leanness is positively associated to internationalization success.*

The "*Lean Startup Methodology – Internationalization Success*" relationship is postulated to be moderated by (a) inter-firm networks and (b) market and technology uncertainty. Refer to the conceptual framework below (fig. 12) which visually illustrates all the hypothesized relationships:
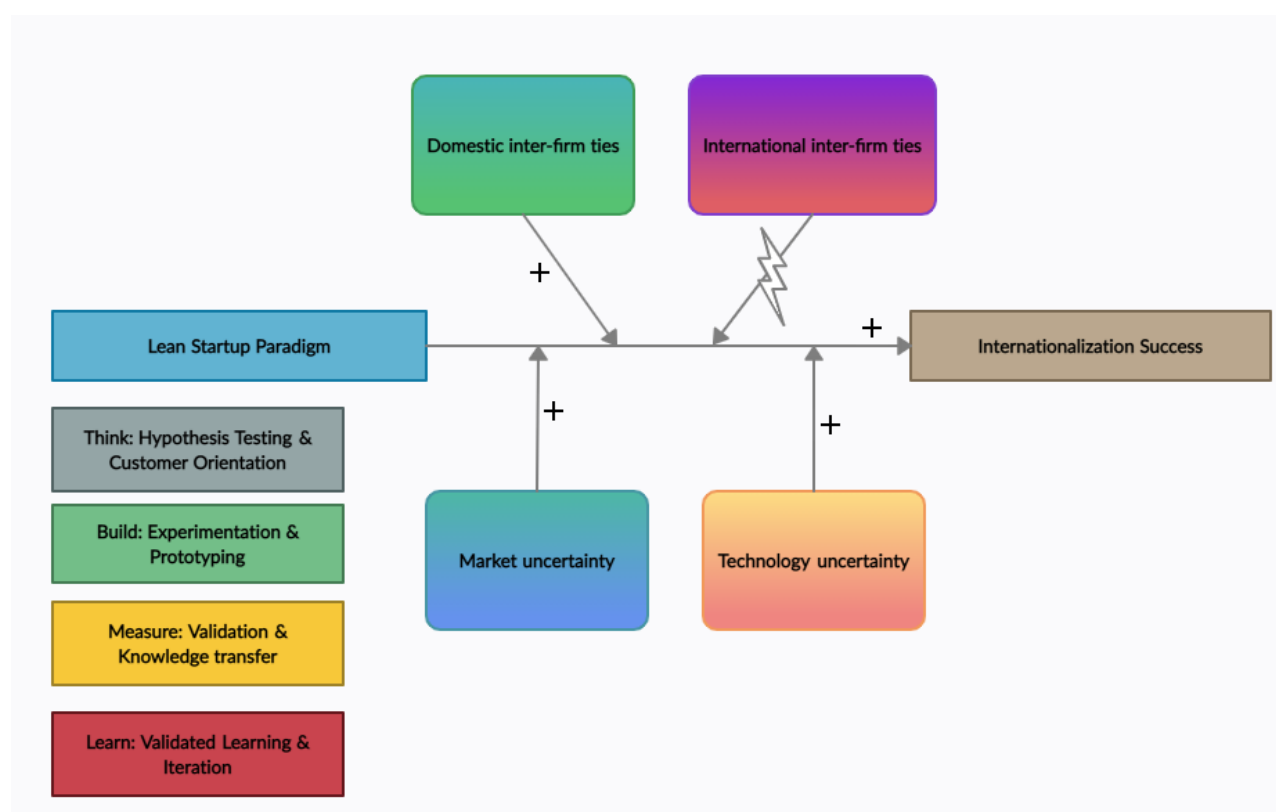

Figure 12: Conceptual Framework

It has by now already become evident that role of networks, backed up by both internationalization (local and international clusters) and Lean Startup / Born Global (inter-organizational positioning and resource complementarities) literature, play a significant role with regards to firm's

internalization success. The next section would provide theoretical arguments concerning the influence of inter-firm networks and how it moderates the "*Lean Startup Methodology – Internationalization Success*" relationship.

National or domestic inter-company networks augments new venture's probability of success in their international markets by contributing awareness of the mechanism of internationalization, evaluating, and leveraging international prospects, improving their credibility, and refining well-established processes (Bembom, 2018). First, the existing inter-company networks offer vital awareness of internationalization, which allows emerging companies to prevent expensive pitfalls and facilitates their internationalization attempts. New ventures may vicariously gain knowledge and understanding of internationalization via the evaluation of closely positioned national network affiliates (Fernhaber & Li, 2010). As new companies appear to mimic the actions of firms in their near proximity (Fernhaber & Li, 2010; Fernhaber et al., 2007), they might look up to inter-company network partners and gain knowledge on how to internationalize in order to increase their probability of success (Bembom, 2018; Fernhaber & Li, 2010). Given their familiar relationship, inter-firm network members often face identical mundane problems and can offer timely guidance as to how to prevent expensive internationalization pitfalls (Bembom, 2018; Prashantham & Birkinshaw, 2015). In addition, given this gained knowledge of internationalization, this eliminates startups from falling into the same trap and cuts unnecessary cost of failure (Prashantham & Birkinshaw, 2015), which in the process boosts international venture success (Bembom, 2018).

Second, domestic inter-company contacts also provide awareness of foreign market penetration opportunities and how best to take advantage of such opportunities (Bembom, 2018). Network connections help recognize prospects for international markets (Coviello & Munro, 1997) and offer additional access to existing distribution networks (Coviello & Munro, 1995; Zain & Ng, 2006), both of which empower new ventures to minimize exploration expenses and facilitate in planning effectively for their initial commencement into the international markets (Bembom, 2018). Even though the new ventures are able to imitate the inter-firm networks who have achieved successful internationalization and in the process being simultaneously successful by exploiting such opportunities (Fernhaber & Li, 2010), Prasahantham and Birnshaw (2015) warns that at times these domestic networks might restrict the firms to the national ecosystem and inspire them to utilize their minimal resources for domestic events, restricting their chance to explore highly valuable foreign opportunities (Bembom, 2018).

Third, close associations with local inter-firm network partners may also foster beneficial reputational recognition, which facilitates their accessibility to the knowledge required for their subsequent internationalization (Bembom, 2018). Closer ties with domestic associates could serve as a symbol of allegiance, trustworthiness, and sound credibility, since opportunistic conduct has greater repercussions in the domestic climate of companies than in the foreign environment (Al Laham & Souitaris, 2008; Gulati, 1995). As a result, domestic companies have better access to valuable knowledge if they are closely tied to a reliable third party (Powell et al., 1996), which in turn enhances the effectiveness of the internationalization of firms (Bembom, 2018).

Lastly, close partnerships with local firms improve the cost-effectiveness of the startup company which in turn can lead to competitive edge (Bembom, 2018). Near collaboration with domestic partners might deliver a wide range of expertise and supplementary skills which mostly permit advancement in the value chain and can enhance the effectiveness of operations, which in return boost the production of intellectual prowess (Chetty & Wilson, 2003; Manolova et al., 2010). Here the research findings of Zijdemans et al. (2015) and Rasmussen & Tanev (2015), specified in subsections 3.5.3., needs to be pointed out. Here they discussed the importance of global value generation concept

in association to the inter-organizational networks and its competence in providing complementary resources for technology startups pursuing a lean global strategy. They added that the acquisition of complimentary resources from close networks, positively influences the global entry in pursuit of a niche market.

Quite a lot of justifications were mentioned in the preceding paragraphs, the discussion next would follow by taking one pretext into account, i.e., domestic inter-firm network's ability to provide awareness of potential foreign market opportunity. This argumentation will be exemplified next, taking into account the lean startup approach.

As an awareness (prospective opportunity) of internationalization is generated from a domestic inter-firm network, the adherence to Lean Startup Methodology would imply that the new opportunity prospect propagated through domestic partner can act as a basis for hypothesis generation. This is comparable to the "ideation" subconstruct of the Lean Startup Methodology. The prospect can be considered as a non-empirical substance which requires factual and observational validation. The likelihood of success is elevated (Ladd, 2016), when the hypothesis or in this case the new opportunity is validated. Secondly, the validated hypothesis or alternatively the validated learning which occurred through this hypothesis validation, can result in quicker decision-making and money savings (Skyes & Dunham, 1995) with regards to making a product aligned to actual foreign customer needs. Research has shown that learning about customer needs paves way for successful products (Griffin & Hauser, 1993). According to Harms et al. (2015), focusing on the clients early helps to generate positive impact such as lower production costs and subsequently shorter time-to-market.

Additionally, validation requires experimentation and prototype establishment (popularly known as an MVP), through which further accelerated time-to-market and cost-savings are realized (McGrath, 2010). The usage of low-cost prototypes or MVPs can be considered as a cost-effective method for authenticating assumptions, gathering customer inputs and bridging communication difficulties (Eisenmann et al., 2011; Kerr et al., 2014; Duc & Abrahamsson, 2016). As the Lean Startup Methodology is contingent upon the notion of Build-Measure-Learn loop, new knowledge (learning) is generated iteratively. Finally, the adherence to learning and knowledge transfer through hypothesis validation can be considered as being among the essential aspects of Lean Startup Methodology, which is principally regarded as a strategic advantage (Calantone et al., 2004) and thus, roadmap to success (Baron & Henry, 2010). This is further reinforced through domestic inter-firm ties as they play a significant role in bolstering the firm's accessibility to further knowledge. In addition, research findings on networks suggest that they are critical for entrepreneurial firms with regards to speeding up the learning mechanism (Eriksson et al., 1997). If learning occurs faster, this indicates that the effectiveness of Lean Startup Methodology is strengthened and subsequently greater probability of success in foreign marketplace.

In summary to the claims alluded above, it can be hypothesized that:

H2: *The effectiveness of the "Lean Startup Methodology – Internationalization Success" is positively moderated by the closer inter-firm relationship to domestic networks. The stronger the inter-firm relationship to domestic network, the stronger is the likelihood to internationalization success.*

Contrary to domestic networks, it can be postulated that international networks negatively moderate the link between LSM and internationalization success. The stronger the inter-firm relationship to international network, the weaker is the likelihood to internationalization success. Firstly, this conjecture is directly linked to higher transfers costs for the acquisition and integration of knowledge

from international inter-firm networks and also heightened coordination efforts (Bembom, 2018). Here this research would like to reinforce the above statement by pointing out the findings of Harms & Schwery (2019), where they discuss the net benefits of LSM as a function of cost or unit cost of knowledge obtained by this approach. They argue that "costs are the time and effort that is required to obtain the information that leads to learning and reduction of uncertainty. (..) the unit cost of information obtained is context specific" (Harms & Schwery, 2019; pg. 13). Given the context specificity of internationalization, taking into account the factor of geographic dispersity and the resulting physical detachment between the representatives of the network, sharing of information amongst stakeholders poses a challenge and leads to higher convergence costs (Bell & Zaheer, 2007). The crucial point is that elevated spatial distance reduces the probability of scheduled and frequent face-to-face consultations which are needed for the transfer of rich and tacit knowledge exchanges (Knoben & Oerlemans, 2006; Shaw & Gilly, 2000). In fact, the understanding of codified information involves implicit/tacit knowledge and thus the significance of spatial proximity (Howells, 2002). It is therefore more complicated and expensive for internationalizing companies to benefit from extensive knowledge on global markets and the possibilities created by their international inter-company counterparts. The relative scarcity of face-to-face encounters could imply that the phase of knowledge absorption can be lengthy and full of misconceptions (Bembom, 2018).

Secondly, geographic separation often raises the expense of tracking and coordinating the firms' foreign networks (Bembom, 2018). Spatial divergence between network members raises costs of managing, since geographically dispersed structures need greater collaboration efforts than networks in close proximity, for instance, coordination across various time zones (Hutzschenreuter et al., 2014, 2016). Geographic detachment also raises the expense of tracking the company's overseas inter-firm network affiliates. Monitoring the foreign partners is highly recommended (Funk, 2014) and the geographic segregation complicates the situation, because if not, this could be quite risky given the fact that foreign partners are more likely to act opportunistically in comparison to the domestic partners (Capaldo & Petruzzelli, 2014). Further literary works indicate that undependable network partners may have a detrimental effect on the ability of a company to compete in international business opportunities (Mort & Weerawardena, 2006), and a high dependency on international ties may shut the company out of distributor networks (Chetty & Wilson, 2003) or prospective clients (Presutti et al., 2007). And as such, since the costs of new enterprises are greatest at the start of the first entrance into the global market (Sapienza et al., 2006), internationalizing companies must make considerable efforts to avoid harmful actions through their international inter-company network contacts (Bembom, 2018).

To sum up, the potential advantages of knowledge from international inter-business networks may be useful altogether in many instances for new companies, but new ventures do not always have adequate resources and operating with international network counterparts requires significant collaboration and knowledge assimilation costs, which can at times reach a point where these costs outweigh their advantages (Bembom, 2018). Taking the rationale of "per unit cost – knowledge acquisition (LSM)" into account, it seems like the acquisition of knowledge from international inter-firm network is a treacherous process and can lead to significant increase of the cost. The underlying assumption of the Lean Startup approach is all about cost reductions as the process strives to acquire knowledge faster. If firms are more invested in devoting considerable time and scarce resources (indirectly elevated cost) on the maintenance of international inter-firm network ties, this seems to be counterproductive as they are hindered from taking up the activities which are much more beneficial and aligned towards the lean approach to internationalization

In summary to the claims alluded above, it can be hypothesized that:

H3: The effectiveness of the "Lean Startup Methodology – Internationalization Success" is negatively moderated by the stronger inter-firm relationship to international networks. The stronger the inter-firm relationship to international network, the weaker is the likelihood to internationalization success.

Another moderator where the effectiveness of the Lean Startup Methodology – Internationalization Success is contingent upon, is the degree of uncertainty. The emphasis on large degree of uncertainty is especially important in the sense of emerging technology firms (Tanev et al., 2015; Yadav et al., 2006). Moriarty and Kosnik (1989) identified two distinct forms of uncertainty that might be specifically linked to the scope of technology start-ups applying the lean startup approach - market uncertainty and technology uncertainty (Tanev et al., 2015). Market uncertainty is related to concerns such as: the type of needs that are required to be tackled by emerging technologies and whether these necessities will evolve in the long term; whether or not the market would further embrace the standards set by the industry; how rapidly innovations can spread and how significant the market potential is (Tanev et al., 2015; Yadav et al., 2006). The technology uncertainty applies to concerns which includes to what extent: the product works as anticipated; the delivery schedule is complied; high-quality service is offered by the vendor; the technological advances renders current technology redundant (Tanev et al., 2015; Yadav et al, 2006).

Harms et al. (2019) has a very intriguing rationale on addressing the role of these uncertainties. The net advantages of the Lean Startup approach is contingent on its expenses and gains or on cost per unit of the knowledge collected by the methodology. Costs are mainly associated with the money and resources involved to acquire knowledge, which in turn contributes to learning, hence contributing to uncertainty reduction. This requires, for example, expenses for identifying and involving participants as well as for incorporating the approach. They contend that the price per unit of the information presented by LS is unique to the context.

Their argumentation in conjunction to the role of the moderator, i.e., market and technology uncertainty is as follows. First, uncertainty in its most generic form is all about information which is missing. Whenever high uncertainty prevails, an extra unit of commitment expended on learning would dramatically increase expertise obtained. That being said, the farther entrepreneurs actually know, the less extra information they will acquire, given per unit of extra learning committed. In a hypothetical world of no uncertainty, entrepreneurs are not able to obtain any additional knowledge by relying heavily on the Lean Startup Approach (Eisenmann et al., 2011). In light of this argumentation, Harms et al. (2019) points out to a qualitative market research by Griffin & Hauser (1993) on decreasing returns on information, where the rate of additional consumer concerns identified declines with a rise in the number of customers interviewed.

Furthermore, they also points out to the true Knightian (1921) uncertainty. In this case, the Lean Startup Approach allows entrepreneurs to prevail more agilely by encouraging identification of early market demands (Camuffo et al., 2017) and facilitating flexible processes for product growth (Thomke & Reinertsen, 1998). It needs to be pointed out that, Harms et al. (2019) utilized these rationalizations under the context of Lean Startup – Performance relationship. However, this narrative could quite well be applicable and projected on to this research context, as greater performance obtained by this approach is reciprocal to internationalization success. In accordance with sound judgement, ´the level of market and technological uncertainty is further elevated under the context of internationalization. Greater levels of uncertainties imply that the entrepreneurs are able to extract more knowledge by greater adherence and commitment to Lean Startup Methodology. As knowledge increases, so does the probability of success under any context. Whether this holds true, it remains to be seen.

In summary to the claims alluded above, it can be hypothesized that:

H4: The effectiveness of the "Lean Startup Methodology – Internationalization Success" is moderated by market and technological uncertainty. The higher the market and technological uncertainty, the higher is the likelihood to internationalization success.

5. Methodology

In this section, the information and/or data which will be necessary for an adequate testing of the hypotheses mentioned in the previous subsection will be elaborated upon. In addition to that, this section would also emphasize upon the specifics of how such information and/or data will be obtained (data collection). Finally, this segment would also describe the process of operationalization, concerning the different variables. These can be subsequently analyzed in order to verify the different causal relationships.

5.1. Research design

This research is in terms of its empirical validity quite unique. This is mainly due to the fact that the guidance provided by the Lean Startup Methodology is quite popular amongst practitioners but when one steps into the academic world of research, the overarching topic of Lean Startups is quite under researched. Search queries in databases such as Google Scholar, Web of Science and Scopus resulted in handful of research papers which really dug deep into the amalgamations of Lean Startup approach, high-tech startups and most importantly its internationalization implications. To be more precise, there were none to be found. Some evidences were found in association to, for e.g., business model innovation, but it lacks the necessary in-depth analysis and the scope when it comes to the new high-tech startups and internationalization context. So, the absence of its conceptual composition meant that multiple research strands needed to be borrowed and compiled together in order to transform it into a unified singular entity. Nevertheless, it should be noteworthy to mention that the scientific findings of Patz (2013), Rübling (2016) and Harms et al. (2019), who first took the challenging steps of conceptualizing qualitatively, and later operationalizing it quantitatively, forms the foundational substance of this research.

The absence of adequate secondary data sources on the applicability of Lean Startup Methodology, meant the acquisition of primary data via a survey instrument, with regards to the concretization and operationalization of the Lean Startups subconstructs. A quantitative methodology was therefore chosen to test the formulated theories and to draw generalizable conclusions regarding the influence of Lean Startup Methodology (LSM) on the internationalization success. In order to achieve this and also to analyze the adequacy of the LSM – internationalization implication, a type of observational study, more specifically, a cross-sectional survey design was chosen, which analyzes data from a population or a representational subset, at a specific point in time. According to researchers, such as Fowler (2009) and Saunders et al. (2009), a cross-sectional study helps in generalizing inferences from a narrower sample to a population group in a fair and equitable way (Schwery, 2018). After having collected the data, a moderated regression analysis will be conducted which would help to investigate the causal relationships between the variables.

After having substantiated the choice of the research design and in conjunction with the creation of the preliminary database, it is firstly important to select an applicable sample set. Furthermore, the dependent variable and the independent variables, control variables and items for the reflective measures of the survey needs to be established. Contingent upon this motive, the next subsections are explained.

5.2. Sample selection strategy and data collection

Identifying new high-tech companies that have expanded internationally quickly after their launch can be difficult (Oviatt & McDougall, 1997; Zahra et al., 2000), but certain parameters were used in order to collect a best-effort representative dataset of early internationalizing high-tech enterprises. Established research (Autio et al., 2000; Schwens et al., 2018) found that the firm's age at internationalization can have implications for both their international success and also overall performance. Taking account of this argumentation, one of the selection criteria that was set for this study is making sure that these firms have entered international markets directly after or soon after their establishment (De Clercq et al., 2012; Rialp et al., 2005). This concept also stresses the timeliness of international expansion and includes most startup terminologies, such as International New Ventures (INVs, Oviatt & McDougall, 1994), Born Globals (BGs, Knight & Cavusgil, 2004) and Global Startups (Jolly et al., 1992), as long as these firms have ventured overseas within 3 years of their founding and have not reached a state of maturity, by restricting its formation year to no longer than 6 years ago (= 2020 as the baseline; Zahra et al., 2000). Thereby, this study acts in compliance with the concept provided by Coviello (2015) while considering only those businesses that can still be counted as new, which per definition encompasses a few years after the company was initially created. Further, it has already become evident by now that this study specifically discusses about high-tech startups, and this is further clarified by including those ventures which competes in one or several frontier technology industries. The choice of the industry were based on the ensuing reasons. As a result of the idiosyncrasies of their business, small high-technology businesses are often pushed to be international at or close inception (Johnson, 2004). Empirical analysis indicates that small high-tech businesses are often required to engage in early internationalization in order to thrive, expand and prosper (Coviello and Munro, 1995; Oakley, 1996).

The research findings showed that small high-tech companies are required to internationalize early on because of the increased speed of global technical progress, leading to fairly short product life cycles, which applied in combination with high R&D costs, essentially precludes sole domestic orientation if the company's financial objectives are to be attained (Johnson, 2004). Therefore, they possess key characteristics that match the appropriate eligibility criteria for the current analysis. There is no single definitive methodology for identifying and defining high-tech sectors. The OECD (1997) describes high-tech industries based on their comparison of industry R&D intensities, an estimate comparing industry R&D investments by industry revenue. Aerospace, electronics, pharmaceuticals, computers (software and hardware), communication devices, scientific (medical, precision, and optical) instruments, services, nano- and biotechnology are sectors classified as high-tech (Quas & D'Adda, 2018). This research did not limit itself to a particular predefined set of high-tech industries as this can probably have adverse effects on finding sufficient survey respondents and thus resorted to higher industry variability amongst the high-tech sectors. As long as these startups were science- and knowledge-based enterprises focusing on technological innovations, they were included in the survey.

After having set the tone in conjunction to the criterion the sample needs to fit, a non-probability sampling technique, more specifically a mixture of snowball and purposive sampling technique was chosen. Even though a probability sampling technique might have been the ideal choice for quantitative studies due to its benefits regarding the generalizability to a larger population, a probabilistic or random sampling seems to be not feasible for this study as it is impossible to obtain a sampling frame. Let us take for example the most primitive form of probability sampling (every member in the population has the equal probability of being selected), in other words a simple random sampling. This would imply that the entire population of new high-tech startups who have internationalized in the globe needs to be known and selected for the study through some kind of "random" procedures, such as assigning a number to every member of the population and choosing the

numbers randomly through a computer program (as an example). This goes beyond the scope of this study and was thus not pursued further. A snowball sampling method, coupled with purposive (criterion-i, Palinkas et al., 2013) sampling was chosen because on one hand, the snowball sampling helped in first finding a small group of samples initially through referrals of the researchers professional working network. These were then extended by asking the initial participants to provide contact information for possible new participants. These new participants were also asked to supply contacts. This led to the quick and substantial growth of the initial small set of participants. It must be noted that here in this particular case there is this added risk that the study might have selected a significant number of colleagues, friends, or acquaintances. These people could share a characteristic that differ systematically from others in the population. So, the generalizability of the research findings needs to be observed with caution. On the other hand, with the help of criterion-i sampling this research made sure that it purposefully chose only those participants among the broad set of participants (retrieved from snowball sampling) based on criterion (for e.g., high-tech involvement, quick internationalization, venture's newness etc.) which the research chose to follow at the onset. Here it must be also warned that the criterion which were set by this study is after all based on research findings of other researchers. It could be that those research findings of the researchers had biases creeped into their judgement and thus generalization or representativeness of the entire population could be limited.

In order to specify the population sample that meets these parameters, a multipronged data collection approach (Harms & Schwery, 2019) was employed in order to maximize the response rates from startups as low response rates from surveys were expected. The primary source of data collection was the venture database Crunchbase. Crunchbase in its free version is very basic and all the functionalities are not available. A pro version was obtained through the researcher's professional organizational, where licenses can be assigned to the members upon special request. As the access was gained, a search strategy was populated, using keywords such as technology, high-tech, tech, IT, network security, cloud computing, AI, VR, electronics, telematics, telecommunication, material technologies, aerospace technologies, smart home, renewables etc. During each session, the search strategy was narrowed down to different continents and their corresponding countries / cities, where popular high-tech startup hubs were located. Further, special attention was given to search filters in Crunchbase such as formation dates (> 2014), number of employees (between 1 and 50), operation status (active) and IPO status (private).

Whether the firms were internationally involved or not or when was their first international market entry, such filters were not available in the database. Fortunately, the self-administered survey had some conditions implemented in it, which would bring the survey to an end if certain criterion (e.g., compulsory data input → active in international markets or not, formational years etc.) were not fulfilled. By utilizing the professional network of the researcher internally, the founder of Ernst & Young's Startup Academy was contacted. This helped in finding further referral sources (Snowball Sampling). In addition to that, social media sites of startup communities such as EY Etventure Startup Hub, German Startup Association, Facebook groups etc., were used to raise awareness of the research. Company networking websites such as LinkedIn and Xing were utilized in order to establish the founders or CEOs, which subsequently served to evaluate even further potential prospects. A total of 11.386 high-tech startups were identified (through the database) across the globe. They were approached by sending anonymous emails (anonymous = the origins of the respondents are non-traceable; refer to **Appendix 1** for email formulation) to the founders which contained a self-administered survey questionnaire (link) and requesting them to fill in the survey. A landing page (refer to **Appendix 2**) with a unique domain was also created which mainly helped in generating more attention within the social media community.

As illustrated in **Appendix 1** and **Appendix 2**, on both the email and the landing page, the content matter of the research was kept a bit concealed. The aim of the study was stated as to investigate a technique that characterized a company's internationalization process rather than Lean Startup in order to prevent a biased selection impact of lean startup affine enterprises and also not to dissuade those companies who do not self-identify as lean from the start. As time passed by, it became evident that the response rate was very low which is nothing out of the ordinary since research participation is influenced by the amount of pressure exerted on the startup's founders by their respective investors, making them less likely to engage. A fundamental element of increasing the return rate was securing the proper incentives. Full secrecy was guaranteed and just the minimum data which was necessary was asked to overcome this barrier. Any identifying information which could aid in pinpointing them or the venture were made mandatory in the survey. But the return rates still were not sufficient. Combining the roles of non-monetary and monetary incentives, somewhat better return rates were realized. As part of the non-monetary incentive, once the study was completed, the results were guaranteed to the study participants. Additionally, a raffle draw (refer to **Appendix 1A**) was created were the survey participants gets the chance to win an Amazon shopping voucher worth 250 €. Follow-up / reminder emails were also taken into consideration.

As lower response rates were expected, this research also resorted to offline methods. By offline method what is actually meant here, is by resorting to direct telephone calls to the founders. High-Tech Gründerfonds, a venture capital website who provides funding to high-tech startups, publishes a list of their investment portfolio. The list contained basic information of the startups along with the founder's telephone numbers. This list was utilized for the direct calls. The telephone calls were very effective as during the social exchanges the researcher was able to communicate the significance of the research and how it could benefit them instead of founders reading an abstract email where the odds of the email being marked as a spam is high. The social exchange strategy during the phone calls resulted in more willingness to fill out the survey and increased the probability of completed surveys. Altogether, this resulted in a final sample of 59 filled out surveys through the means of online and offline collection approaches.

The origin of these startups were from different continents and varied between 83.05% in Europe, 8.47% in North America, and 8.47% in Asia. This geographical variability could imply that the findings of this study could be representative beyond a particular location.

5.3. Operationalization strategy and variables establishment

Section 4 of this research was ponderously utilized in order to form the conceptual foundation of the Lean Startup Methodology. Inspired from the theoretical rationale of Schwery (2018) and Harms et al. (2019), this research borrowed the different perspectives needed, which subsequently facilitated the development of the construct. Founders can have varying views of their lean start-up strategy due to a lack of consistent understanding or knowledge of lean startup practices. Rather than just questioning them specifically about their lean startup aspirations, indicative measures were used to promote the judgment of the entrepreneurs. A research instrument was constructed which would acquire the core elements of the Lean Startup methodology, in order to quantify the level of familiarity with the business' lean startup familiarization (independent variables) and to scientifically assess the effect on the success of a Lean Startup oriented internationalization endeavors (dependent variable). Six imperatives of concern are thus included within the survey: (1) Lean Startup Methodology; (2) internationalization success; (3) domestic inter-firm ties; (4) international inter-firm ties; (5) technology certainty; and (6) market certainty.

The prior sections have already cited literature backings, presenting sufficient theoretical support for these steps in order to reach the scientific validation of the examined study topic. At a later point, this

segment would also further discuss how each and individual scales were constructed and their sources in scientific literature. Scales adhering to the Likert-approach (several items reverse coded) were adapted from published studies. Wherever practicable, by the utilization of current methodological literature, the scales were tailored or appropriated in order to guarantee the reliability and validity of the results. A 5-point Likert scale was used to anchor objects from each build. The investigation was carried out by a survey of the function in the reflective structures. In the following paragraphs, each variable is briefly discussed

The **dependent variable, i.e., internationalization success**, refers to the new venture's business success taking into account the last time they entered a new international market with their products/services. The choice between objective and subjective metrics of success is the topic of an active literature discussion. While objective indicators are less susceptible to common method variance (CMV) and are particularly appropriate for assessing the financial results of companies (Stam & Elfring, 2008), there are also limitations to their usage (Bembom, 2018). Firstly, it is quite difficult to obtain quantitative objective measures because quite a lot of businesses are not willing to report their financial account reports (Woodcock et al., 1994), and emerging/new companies are especially hesitant to reveal their financial results (Wang et al., 2017). In additament, due to contrasting accounting principles for organizations (Hult et al., 2008) and also because of variations in efficiency and profit across sectors, quantitative/objective metrics can be difficult to ascertain (Bettis, 1981). Most notably, in measuring the success of early internationalizers, quantitative success metrics might be inappropriate and deceptive (Bembom, 2018). In particular, the strategies of companies focused on internationalizing early can vary, since not all early internationalizers strictly adhere to optimizing their objective success metrics (for instance ROI, ROA etc.) (Hult et al., 2008), and instead aim to reach several international markets, irrespective of the effects on their success performance (Mort & Weerawardena, 2006). Given these disadvantages of objective success metrics, subjective measures were used in this analysis, a selection that is compatible with all major early internationalization studies exploring facets of success (Gerschewski & Xiao, 2015).

Subjective evaluation measurements are suggested in prior research where quantitative measures are not usable, unreliable, or not comparable (Dess & Robinson, 1984). Studies find elevated associations amongst subjective and quantitative success indicators (e.g., Glaister & Buckley, 1998; Hollender et al., 2017) and high convergent validity (Wall et al., 2004). In addition, subjective metrics can contain progress/success facets (e.g., customer satisfaction-, customer acquisition rates in conjunction to new products) something which cannot be reflected by quantitative measures, and these success dimension might be much more essential to new ventures internationalizing early than objective instruments (Bembom, 2018; Brouthers, 2002; Brouthers & Nakos, 2004).

For measuring internationalization success, this research mainly laid emphasis on Vorhies and Morgan's (2005) scale on business success and adapting it to reach more conformity given the internationalization's context. The scale was built by conforming to a comprehensive picture which took into account all aspects of a new firm internationalizing, i.e., the influences of customer satisfaction, market effectiveness and current profitability. The subjective assessment of customer satisfaction was based on a synthesis by Fornell et al. (1996). Market effectiveness was composed using another scale which Vorhies & Morgan (2005) adapted from another of their scientific work (Vorhies & Morgan, 2003), where they tapped the degree to which the firms' market-based goals had been achieved. Finally, profitability took into perceptual oriented performance measures based on the works of Morgan, Clark and Gooner (2002). The overall scale was further complemented by empirical works of Nummela, Sarenketo and Puumalainen (2004), where two items referred to respondents' satisfaction with their firms' overall positive effects on profitability and general success given the

international market. In the sense of early internationalizing companies, the accompanying items are particularly important because companies may not be as pleased with any one domain of their success as they are with their overall accomplishment in their foreign market (Bembom, 2018; Lumpkin & Dess, 1996).

For the measurement of the **independent variable, i.e., the Lean Startup Methodology (LSM)**, it is composed of several activities which define LSM and can be apprehended as a higher-order formative construct (Diamantopoulos & Winklhofer, 2001; Schwery, 2018). This measurement scale for this construct was completely borrowed inspired by the works of Harms & Schwery, 2019. This is mainly due to the fact that the scale produced by this article is the only available measure in the scientific world which measures the lean startup approach quantitatively and also recently it won a prize for being the most downloaded paper in 2020 on the Journal of Small Business Management published by Taylor & Francis. In addition to that, the context where their research applied the scale dealt with the implications of new software venture's lean startup approach on their performance metric, which is to a very high extent applicable for this research context. Given this comparability and reciprocity, this research chose to utilize this scale and assumes to establish reproducible results. Based on these grounds, the scale of Harms & Schwery (2019) were constructed in the following manner:

By evaluating lower-order reflective constructs, formative constructs are induced (Schwery, 2018). The lower order compositions accordingly form the features of the formative higher order construct (Jarvis et al., 2003; Schwery, 2018). Given this phenomenon of lower-order reflective compositions inducing the characteristics of higher-order constructs, LSM in this case was modeled as a second-order formative construct with reflective subdimensions, analogous to the studies of Schwery (2018) and Harms & Schwery (2019). This implies that the reflective measures, given their commonalities in themes, are expected to covary (Jarvis et al., 2003). Thus, the reliability and validity of the reflective constructs will be checked through exploratory factor analysis and other checks later on in the thesis. The reflective subdimensions as specified in subsection 4 are customer orientation, hypothesis testing, experimentation, prototyping, validation, knowledge transfer, learning and iteration. These reflective subdimensions should "capture fully the construct's domain of content" (Diamantopoulos & Winklhofer, 2001, p.272).

The specification of the indicators and scales for the second-order construct were appropriated from the study of Harms et al. (2019) and they proceeded by analyzing the literature to find validated scales which fit the substance of the predictor variable as best as possible. It should be worthwhile noting that two established scales were found. They resorted to Cui and Wu's (2016) scale "experimental NPD" for the predictor subconstruct "experimentation" and Calantone et al.'s (2002) scale "commitment to learning" for "learning". Established scales, for the remainder of the subconstructs, i.e., customer orientation, hypothesis testing, prototyping, validation, knowledge transfer and iteration were developed by drawing inspiration from lean startup-oriented studies from Rübling (degree of leanness, 2016), Patz (qualitative definition and practioner's view to lean startup, 2013) and Frederiksen & Brem's (scientific reflection on lean startup approach, 2017). Formulation guideline as proposed by Diamantopoulos & Winklhofer (2001) such as clarity, length, directionality, lack of ambiguity and avoidance of jargons, were strictly followed by them.

One chunk of the **moderator variables are national- and international inter-firm tie strength**, appropriated from Bembom (2018), where each variable is composed of a formative indicator. The items for each of the variable is composed of three elements: frequency, length, and intimacy, which is considered by Granovetter (1973) as measures of tie strength. According to Bembom (2018), each and every item are attested by established literature and they stem from international diversification- and new product introduction based scientific works of Collins & Clark (2003), Smith et al. (2005) and

Zimmerman et al. (2009). For the first level, interviewees would be questioned to determine the interaction level of their firms to that of their regional interconnections and also international inter-firm linkages, based on a 5-point Likert scale varying from multiple times per week to just under couple of times in a year. The second parameter has to do with the time or more specifically the duration of time the firms are involved in direct communication with domestic and foreign contacts. Finally, the third aspect encompasses the intensity of "intimacy" in conjunction to knowledge sharing with their local and foreign counterparts, ranging from mostly superficial to significant information exchanges. Given the characteristic of tie strength being a formative measure (Anderson, 2008), according to Diamantopoulus & Winklhofer (2001), administering conventional inspections of reliability and validity can be regarded obsolete. Diamantopoulus & Winklhofer (2001) mention that "reflective indicators are essentially interchangeable (and therefore the removal of an item does not change the essential nature of the underlying construct), with formative indicators' omiting an indicator is omitting a part of the construct" (p. 271). This implies that measures such as factor analysis which are more customarily used to determine the reliability and validity of reflective measures do not extend to items consisting of formative attributes (Bembom, 2018; Diamantopoulus & Winklhofer, 2001).

Another chunk of the **moderator variables are market and technology uncertainty**, which is both based on the market and technology turbulence principles of Jaworski & Kohli (1993). The authors argues that when market turbulence i.e., "the rate of change in the composition of customers and their preferences" (p. 57) is high, it is more likely that firms have to alter and modify their products on a continuous basis in order to cater the needs of dynamic customer pain points. This research found parallels to this notion and argues that new firms venturing into the unknown (i.e., internationalization) cannot expect to have a stable market condition but rather conditions much more intensified with regards to both market and technological uncertainty dynamism. Adhering to lean startup approaches helps in such situation by accelerating the learning curve and per unit of extra learning committed (Harms et. al., 2019). The items in the scale proposed by Jaworski & Kohli (1993) effectively measures both the uncertainties and is thus chosen.

With regards to **control variables**, **pre-internationalization phase** (difference between year of founding and first foreign market entry) needs to be determined. This is mainly due to the fact that this difference should determine the firm's age during internationalization and also their level of maturity. Established research (Autio et al., 2000; Schwens et al., 2018) found that the internationalization age of a firm can have implications for both their international success and also overall performance. This should also provide the basis for another control mechanism, i.e., sample selection criterion, in order to obtain a representative sample. According to Bembom (2018), new ventures must have expanded into international markets either from or soon after their establishment (De Clercq et al., 2012; Rialp et al., 2005). This concept stresses the timeliness of international expansion and includes most startup terminologies, such as International New Ventures (INVs, Oviatt & McDougall, 1994), Born Globals (BGs, Knight & Cavusgil, 2004) and Global Startups (Jolly et al., 1992), as long as these firms are venturing overseas within 3 years of their founding and have not reached a state of maturity. In reference to reaching maturity, i.e., when does a startup transition from being a startup to a full-fledged business organization, literature review did not provide any scientific evidence or concrete results. So, in order to integrate this control, another variable **"development stage"** should be employed here, which has its scientific basis from the research findings of Scott & Bruce (1987) and adapted from Schwery (2018):

- Early growth: we have developed the products/services and also realized sales to early adopters.

- Rapid growth: we have accelerated growth and customer adoption.
- Maturity: we have an established customer base and flattening growth.

This control variable should provide an extra level of sample selection simplicity as ventures currently in stage 3 and above can be omitted for further analysis. The **duration of international activities** (Gerschewski et al., 2015), also needs to be controlled. The element is important because the first entrance of certain companies into the international market perhaps transpired farther in the past, providing them the incentive to enhance their yields over a prolonged time (Bembom, 2018). A much recent entry would imply that the ventures have not yet recouped their initial investments. As the dimension of the network can impact the success of a foreign venture (Gerschewski et al., 2015), the **size of the national network** and the **size of the international network** as controls would be included in the model (Bembom, 2018). The variables can be calculated as the total count of national- and, accordingly, international inter-firm network linkages at the time of firm's entrance into the global market. Finally, **seniority in the job** (i.e., the time the respondent was employed in his current position) was considered as well because research findings showed that long seniority had a detrimental impact on the planning of suitable long-term strategies (Miller, 1991).

The operational definition of the indicators used in this study and their origins in academic research is seen in **Appendix 3**. The original items were adjusted to fit the context of this study. A table containing the differences between the original items, and the adjusted items and their corresponding reasoning can be found in **Appendix 3A**. **Appendix 4** presents the survey questionnaire which has been used in this analysis to test the concepts.

5. Data analysis

The data analysis process will be divided into many phases, each of which will evaluate the anticipated causal relationships and provide a response to the study question. Initially, a data description is provided, followed by discussion of topics such as validity and reliability checks, assumption testing, and multicollinearity, all of which are necessary prior to actually making inferences with the collected data and conducting appropriate statistical tests. The mechanism behind the analysis for the moderated regression evaluation is also briefly discussed in the last subsection of this chapter.

5.1. Description of the data

The survey was comprised of 66 items which was measured using a Likert scale (5 point), as well as supplementary questions (text insertion) which was necessary to assess the control variables and the demographics of the participants. 11.386 high-tech startups were contacted via the survey instrument and another 165 emails were sent to founders who were contacted via telephone. Altogether, 96 responses were obtained but 37 had to be omitted due to missing data and inclusion criteria which was set up prior to data collection. This resulted in a sample size of 59 cases which was used for data analysis. Most of the companies in the sample showcased a wide array of attributes which can be considered acceptable for the study. The average age of the startups was 3.66 years (2014 = 15.25%; 2015 = 18.64%; 2016 = 15.25%; 2017 = 28.81%; 2018 = 11.86%; 2019 = 5.08%; 2020 = 3.38%) signifying that the startups are quite young. Even though, 30.51% of the startups are based in Germany, a wide variety could be seen in other countries as well, for e.g., Switzerland = 13.56%; Netherlands & England = 13.56 % & Singapore, France, China, Czech Republic, and Finland = 15.25 %. Additionally, the startups originate from three different continents (83.05% in Europe, 8.47% in North America, and 8.47% in Asia). Thirdly, 61.01 % of the startups stem from the second stage (Rapid Growth = we have accelerated growth and customer adoption) of the development categorization which was pre-defined and 37.28 % originate from the first stage (Early growth: we have developed the products/services and also realized sales to early adopters), indicating that the dispersion is not much off from each other. Finally, the industry distribution is also quite diversified ranging from 22.03% (IoT), 27.11% (Healthcare (wearables & SaaS), 16.95% (AI, Cloud Infrastructure & Sensor Tech), 6.78% (Fintech), 20.34% (Lasers and 3D Tech, Industrial Tech; Prop tech & Retail Tech), 5.08% (Sustainable Tech) to 1.69 % (Aerospace). Some descriptive information of the sample is presented next:

The variability of the startups according to their headquarters (no. of counts ranked in a descending order):

Headquartered in:	Counts
Germany	18
Switzerland	8
Netherlands & England	8 (4 each)
Belgium & USA	6 (3 each)
Austria, Canada, Estonia, Spain & Italy	10 (2 each)
Poland, Hong Kong, India, Bangladesh, Singapore, France, China, Czech Republic, and Finland	9 (1 each)

The industry variability of the startups (no. of counts ranked in a descending order):

Industry involvement	Counts
IoT (Smart home, Industry 4.0 & Mobility)	13
Healthcare (wearables) & SaaS	16 (8 each)
AI and Cloud Infrastructure & Sensor Tech	10 (5 each)
Fintech	4
Lasers and 3D Tech, Industrial Tech; Prop tech & Retail Tech	12 (3 each)
Sustainable Tech	3
Aerospace	1

The variability of the respondent's position in the company (no. of counts ranked in a descending order):

Position in the company	Counts
CEO & Co-Founder (also CPO, CFO, CMO, COO, CPO & CTO)	44
Head of Operations (also Head of Global Operations, Operation executive and Head of Global Sales)	6
Director	5
Business Development Manager	4

The variability of the startups' last international market entries (no. of counts ranked in a descending order; note: the countries are grouped together to represent their corresponding cultural and geographical proximity):

Last market entry	Counts
Italy, France, Spain & Portugal	11
North America (US & Canada)	10
DACH (Germany, Austria & Switzerland)	9
UK & Ireland	8
Asia: China, Malaysia, Singapore, Japan & Turkey	8
BENELUX (Netherlands & Belgium)	4
Russia, Poland & Estonia	3
Scandinavia (Denmark & Norway)	3
Middle East (UAE & Israel)	2
South America (Argentina)	1

5.2. Validity and reliability

The validity and reliability of the scales are essential for providing a coherent analysis of the findings. It is necessary to conduct reliability and internal consistency tests on the elements that are combined to form scales. Through the use of an exploratory factor analysis and the consequent investigation of discriminant validity, the validity of the indicators was determined. The Cronbach's alpha coefficient, which is the most widely used technique of determining internal consistency and reliability, was used to determine the reliability of the scale.

In order to establish the validity of the survey instrument, an explanatory factor analysis (hereinafter EFA) was performed. Before carrying out the EFA, it is necessary to check whether the assumptions

are met or not. This question can be addressed by consulting several pieces of information in the output. **Appendix 5** depicts the results of KMO and Barlett's Test.

Bartlett's test is designed to test the null hypothesis that the sample correlation matrix comes from a multivariate normal population where the measured variables themselves are completely uncorrelated (Dzuiban & Shirkey, 1974). Essentially, Bartlett's test is testing whether the sample correlation matrix differs significantly from an identity matrix, with 1's on the primary diagonal and 0's on the off diagonal (Field, 2018). If Bartlett's test is significant, this is taken as indication it is appropriate to carry out EFA on the sample correlation matrix.

One should keep in mind that the power of this test to reject the null – that the correlation matrix is equal to an identity matrix – is impacted by sample size. As such, the test can be overpowered in large samples (Dzuiban & Shirkey, 1974). This can be problematic given that EFA are generally large-sample procedures. Even correlation matrices including small correlations may be deemed as significantly deviating from an identity matrix when the sample size is large (Field, 2018).

Given that the test is significant (p <.001), we might infer that the assumption is met. However, it is also prudent to examine other measures of sampling adequacy such as the KMO.

The overall KMO addresses the adequacy of the measured variables for carrying out EFA. Values can range from 0 to 1, with those approaching 1 as providing stronger evidence that a correlation matrix is appropriate for the procedures (Field, 2018; Kim & Mueller, 1978).

In general, a KMO < .50 indicates that it is not appropriate to perform EFA on a correlation matrix. Tabachnick and Fidell (2013) suggest a threshold of .60 "for good FA" (p. 620). In the output, the overall KMO value is .534, which is consistent with the assertion that it is appropriate to carry out EFA on the data. The next paragraph will explain on how to decide on the number of components extraction. For this, three separate analyses will be used, starting with total variance explained, respectively scree plot and parallel analysis.

With PCA, the number of components extracted equals the total number of measured variables. We had 32 variables included in our analysis – hence, we have 32 components. These components are extracted such that they (a) are orthogonal (i.e., uncorrelated) and (b) account for decreasing amounts of variation in the measured variables (with each successive component).

The 'Total' column contains the eigenvalues associated with each component. In EFA, the eigenvalues reflect the amount of variation in the measured variables accounted for by each component. For example, the first component has an eigenvalue of 6.986 (refer to **Appendix 6**). This means that the first component accounts for the same amount of variation as 6.986 of the original variables. Under the % of variance column, we see it accounts for 21.830% of the variation in the measured variables.

The second extracted component has an eigenvalue of 3.501 (refer to **Appendix 6**), meaning that it accounts for as much variation as 3.501 of the original variables. Moreover, the percentage of variation accounted for is 10.939%. Cumulatively, components 1 and 2 accounted for 32.769% of the variation. The remainder of the components can be interpreted analogously as mentioned above.

A common rule of thumb (and the one invoked using the SPSS defaults) is that retained components should account for as much variation as at least one measured variable. This is the classic Kaiser criterion (or eigenvalue cutoff rule). That is the reason why only 7 components show up under the 'Extraction Sums of Squared Loadings' column here (refer to **Appendix 7**). Another approach to identifying the number of components to retain is to use the scree plot (refer to **Appendix 8**). It is a

plot of the eigenvalues for the components plotted against component number. Notice that the scree plot looks like the side of a mountain. The dominant components fall on the primary slope in the plot, whereas the weaker/trivial components fall in the scree (i.e., rubble) at the base of the plot.

Clearly, there are at least three dominant components (i.e., up until component 10). However, the "rubble" appears to really trail off after Component 10. This suggests that a scree plot representation is not clearly helpful. Note: a criticism of the use of this criterion is its subjectivity. There is not always a clear "break point", as appears here. According to Brown (2015), the Scree Test works best in situations involving large sample size (which is not the case in this survey) and "well-defined factors" (p. 27).

A third option is to use parallel analysis (refer to **Appendix 9**). This option involves the use of simulated (random) correlation matrices in order to arrive at a set of random eigenvalues. The eigenvalues from the data are compared against the random eigenvalues. The decision criterion is simple: retain those components computed from this data with eigenvalues that are greater than the randomly generated eigenvalues. There is NO clean approach to performing this test in SPSS. Because the first seven eigenvalues from this data fall above the first seven random eigenvalues (whereas the random eigenvalues starting with component eight exceed those from this data), this suggests a seven-component solution. Overall, two from three of the approaches in determining the number of components agreed that a seven-component solution should be adopted.

At this junction, the component loadings haven't been decided yet and the analysis would move forward in examining the component loadings. Unrotated component loadings can be problematic from an interpretive standpoint. As such, it needs to be decided on how to rotate the components to facilitate interpretation, i.e., whether the factors loadings load solely on the previously assumed constructs. There are two general classes of rotations: orthogonal and oblique. Orthogonal rotation maintains the assumption that the components are uncorrelated with each other. A common type of orthogonal rotation that is used is Varimax rotation (although another common approach is Quartimax or Equamax). Oblique rotations relax the constraint that the components be uncorrelated (in other words, these rotations allow for correlated components).

Typically, naming components following orthogonal rotation is easier to do than naming components following oblique rotation. Nevertheless, oblique rotation does a better job of capturing the "messiness" of the real world and its data. The seven components of the LSM constructs were taken into consideration while conducting a principal component analysis confined to a seven-factor analysis based on the orthogonal rotation method (Equamax). For regression analysis, which would be conducted at a later stage of this thesis, it is important to retrieve or have independent variables which do not correlate to each other. Keeping this rationale in mind, an orthogonal rotation method is chosen as they do enable possible correlations between the variables. The factor loadings revealed that knowledge transfer and iteration were loading on the same component and were thus combined together to form iterative knowledge transfer. This combination actually made sense as the transfer of knowledge is an iterative process and furthermore, they seemed to be integrally linked. EFA yielded a seven-factor solution with couple of cross-loadings. Ideally, variables will exhibit a high loading on a single component and more trivial cross-loadings on others (Brown, 2015). When variables exhibit similar loadings (in magnitude) across multiple components, then they do not aid in differentiating between the components (Field, 2018). In cases where a variable meets the loading criterion on more than a single component, then one might consider not using it when naming the components (please refer to Tabachnick & Fidell (2013) and Harlow (20014) discussion of "complex variables"). Gorsuch (1982), on the other hand, takes more of a nuanced perspective on this issue: "if the variable has high loadings on several factors, then the variance of the variable must be subjectively divided for

interpretive purposes" (p. 210), as applied in this thesis. In addition to that, the factor loadings of items KT2, IT4 & IT1 reveals that they group together to form another speculative entity which is outside the scope of the conceptual model and thus omitted for further analysis as a part of items refinement. The factor loadings and the corresponding rotated component matrix can be seen in fig. 18 (**Appendix 10**):

In order to lessen the effects of the cross-loadings and also to determine the internal consistency and reliability of the items in the scale, the construct reliability was measured using Cronbach's alpha. As a rule of thumb, the instruments should have a reliability of .70 or more for scientific investigations (Nunnally, 1978). The construct reliability of the seven underlying constructs is measured sequentially for all the items in order to improve the subscales (refer to **Appendix 11** for the sequential depiction).

For the constructs, iteration (0.818), validated learning (0.800), customer orientation (0.778) and experimentation (0.806), were all above the threshold and no refinements were made. For validation, the reliability analysis provided suboptimal results (0.660) after the first analysis. The Cronbach's Alpha was below the threshold of 0.7 and it is clearly visible from the table **(refer to Appendix 11)** that the deletion of V3 would result in the enhancement (0.716) of the reliability. Hence, as a part of item refinement, V3 is thus omitted for consequent analysis. For prototyping, there was a slight bottleneck as none of the item deletion would resolve the problem. As the Cronbach's Alpha of 0.664 is quite close to the threshold of 0.7, none of the items were deleted and were considered for further analysis. Hypotheses testing needed to be refined further as it was slightly below the threshold (0.684). Item deletion of HT1 boosted it further to 0.712.

Cumulatively, the Cronbach's Alpha of the underlying constructs are presented below:

Table 4: Reliability testing (7 underlying constructs of LSM)

	Cronbach's Alpha
Iterative knowledge transfer: items (KT1, KT3, KT4, IT2 & IT3)	0.818
Validated learning: items (VL1. VL2, VL3 & VL4)	0.800
Customer Orientation: items (CO1, CO2, CO3 & CO4)	0.778
Validation: items (V1, V2 & V4)	0.716
Experimentation: items (EXP1, EXP2, EXP3 & EXP4)	0.806
Prototyping: items (PR1, PR2, PR3 & PR4)	0.664
Hypothesis testing: Items (HT2, HT3 & HT4)	0.712

Test for discriminant validity actually examines whether concepts or measurements which are not supposed to be related are indeed unrelated. It is possible to test discriminant validity between constructs in a variety of ways. For instance, researchers can undertake a paired construct test (Jorsekog, 1971), use the Fornell and Larcker (1981) strategy, or evaluate components using a multi-trait multi-method approach. Nevertheless, given the difficulties of collecting data and the requirement for more rigorous validity evaluations, it appears that the Fornell and Larcker (1981) methodology is the most acceptable method to use (Farrell, 2009). Hair et al. (2009, p. 778) state that "the variance extracted estimates should be greater than the squared correlation estimate" and Fornell and Larcker (1981, pp. 45-46) state that for any two constructs, A and B, the AVE for A and AVE for B must both be greater than the shared variance (i.e., square of the correlation) between them. This means that both AVE (average variance extracted) estimations must exceed the common variance estimate. Taking this

notion into account, first the AVE of the underlying constructs are calculated in a separate spreadsheet using the formula = sum of lambda squared / number of factor loadings count. The detailed calculations of AVE for the seven constructs are presented in **Appendix 12**.

After having calculated the AVEs of all the seven constructs, a correlation matrix is generated using SPSS, as depicted in the table below:

Table 5: SPSS generated correlation matrix

Correlation matrix:

	IKT	VL	CO	V	EXP	PR	HT
Iterative Knowledge Transfer (IKT)	**1**						
Validated Learning (VL)	0.16	**1**					
Customer Orientation (CO)	0.13	0.14	**1**				
Validation (V)	0.61*	0.10	-0.04	**1**			
Experimentation (EXP)	0.46*	0.38*	0.04	0.41*	**1**		
Prototyping (PR)	0.16	0.18	0.08	0.24	0.34*	**1**	
Hypothesis Testing (HT)	0.15	0.19	-0.02	0.04	0.26**	0.17	**1**

Correlation is significant at the 0.01 level (2-tailed)*
Correlation is significant at the 0.05 level (2-tailed)**

As it was discussed previously, in order to attain discriminant validity, the corresponding AVEs of the constructs needs to be greater than the squared correlation estimates. In table below, firstly the squared correlation estimates are calculated and compared against their accompanying AVEs.

Table 6: Comparison squared correlation estimates and AVEs

Comparison between corresponding AVEs and squared correlations:

	IKT	VL	CO	V	EXP	PR	HT
Iterative Knowledge Transfer (IKT)	**0.4551**						
Validated Learning (VL)	0.027	**0.558**					
Customer Orientation (CO)	0.019	0.020	**0.561**				
Validation (V)	0.372*	0.011	0.002	**0.507**			
Experimentation (EXP)	0.217*	0.145*	0.001	0.172*	**0.457**		
Prototyping (PR)	0.028	0.035	0.007	0.061	0.119*	**0.407**	
Hypothesis Testing (HT)	0.024	0.037	0.001	0.002	0.071**	0.031	**0.543**

Correlation is significant at the 0.01 level (2-tailed)*
Correlation is significant at the 0.05 level (2-tailed)**

For all the seven constructs above, the associated AVEs are higher than the squared correlation values and thus providing evidence that discriminant validity exists between the underlying constructs.

After having established the validity and reliability of the underlying constructs, the table below provides an overview of all the values which were determined so far:

Table 7: Overview of all values (Mean, SD, Cronbach's Alphas, AVEs and factor loadings

Underlying	Mean	Standard	Cronbach's	Average	Factor

constructs		deviation	alpha	variance extracted	loadings (EFA)
Iterative knowledge testing			0.818	0.455	
KT4	4.62	0.82			0.818
KT1	4.45	1.02			0.735
IT2	4.23	0.87			0.687
KT3	4.64	0.60			0.577
IT3	4.25	0.77			-0.511
Validated learning			0.800	0.558	
VL2	3.86	0.88			0.887
VL4	3.78	0.76			0.848
VL1	4.08	0.85			0.631
VL3	3.71	0.78			0.573
Customer orientation			0.778	0.561	
CO3	4.44	0.74			0.856
CO1	4.66	0.57			0.748
CO2	4.59	0.591			0.692
CO4	4.47	0.774			0.689
Validation			0.716	0.507	
V4	4.05	0.86			0.853
V1	4.03	0.80			0.699
V2	4.01	1.02			-0.554
Experimentation			0.806	0.457	
EXP2	3.90	1.01			0.793
EXP1	4.03	0.87			0.778
EXP3	3.54	0.85			0.598
EXP4	3.59	0.89			0.791
Prototyping			0.664	0.407	
PR2	4.19	0.97			0.757
PR4	3.49	0.91			0.659
PR3	4.10	0.80			0.598
PR1	3.85	0.90			0.517
Hypothesis testing			0.712	0.543	
HT3	3.32	1.27			0.844
HT4	3.36	0.88			0.714
HT2	3.32	0.95			0.638

Finally, a mean score was calculated taking all the underlying dimensions into account, thus providing a unitary reflective first order – formative second order construct (Jarvis et al., 2003).

Internationalization success was measured using established scales of Vorhies and Morgan (2005) and Nummela et al. (2004) on international business success (customer satisfaction, market effectiveness & current profitability). Similarly, the internal consistency and reliability of the items in the scale are checked again sequentially. The results are depicted in **Appendix 13**. The Cronbach's Alpha of the construct Customer Satisfaction produced a score of 0.625 but the items deletion matrix showed that none of the item deletion would enhance the total reliability. All four items were taken into consideration. Current profitability (0.936) was above the threshold. For Market Effectiveness, the initial result was 0.642. Item deletion of ME2 transformed it to 0.757 and thus it was deleted for further analysis. The mean score was calculated here taking into account the underlying subdimensions (i.e., customer satisfaction, current profitability market profitability (item 2 was omitted)).

With regards to the moderator variables, four constructs were taken into consideration. To begin with, market- and technology uncertainty was measured using the established scale of Jaworski & Kohli (1993) which is based upon the market and technology turbulence principles. For market uncertainty, the reliability analysis provided suboptimal results after the first analysis. The Cronbach's alpha was a

meager 0.383. The Item deletion of MU5 helped in strengthening the value to 0.6. For Technology Uncertainty, the same trend could be observed. The first analysis resulted in 0.482. Item deletion of TU5 boosted the value to 0.512. It was further observed that another item deletion of TU4 would help to improve the score by a small margin (0.581). As the further item deletion not enabling the value to go beyond 0.7, it was decided not to delete any more items (refer to **Appendix 14**). The third and fourth moderator variables, i.e., domestic network tie strength and international network tie strength was measured using the scales of Granovetter (1973) based on the rationale of network ties' strength. Both the results (0.814 and 0.742 respectively) were satisfactory, as they were above the rule of thumb > 0.7 (refer to **Appendix 14**).

All the tables in **Appendix 14** with the alpha values which were calculated so far, are now compiled in the table below:

Table 8: Cronbach's Alpha for the dependent variable and the moderators

	Cronbach's Alpha
Dependent variable: internationalization success	
Customer Satisfaction: items (CS1, CS2, CS3, CS4)	0.625
Market effectiveness: items (ME1, ME3, ME4)	0.757
Current profitability: items (CP1, CP2, CP3, CP4, CP5, CP6)	0.936
Moderator variables: market- / technology uncertainty & domestic- / international network tie strength	
Market uncertainty: items (MU1, MU2, MU3, MU4)	0.600
Technology uncertainty: items (TU1, TU2, TU3, TU4)	0.512
Domestic network tie strength: items (DNTF, DNTD, DNTI)	0.814
International network tie strength: items (INTF, INTD, INTI)	0.742

5.3. Assumption testing for regression analysis

In order to find out whether the lean startup methodology significantly influences the internationalization success or not, a parametric test, i.e., regression analysis will be conducted which would subsequently facilitate the hypothesis testing procedure. A prerequisite of parametric test is the assumption of a normal distribution of values. This section would check this assumption and given the normal distribution verified also investigate other assumptions which are related to regression analysis.

The test of normality can be conducted in two-fold ways, graphically or using statistical tests. For statistical test, it is firstly important to understand the null- and alternative hypotheses. The formulation of hypotheses are as follows:

H0: the values are sampled from a population that follows a normal distribution → p > .05
H1: the values are not sampled from a population that follows a normal distribution → p ≤ .05

In an attempt to check normal distribution of the population, both the dependent variable (internationalization success) and the independent variable (lean startup methodology) was analyzed next. First the skewness and kurtosis was checked. The results are depicted in **Appendix 15**. As a rule of thumb, when sample size is below 50 (in this case this can be considered applicable as the sample size is only 59), z values should be used (Kim, 2013). The range of the z-value should be in between -1.96 and +1.96 (Kim, 2013). Z-values can be calculated by dividing the skewness and kurtosis by their respective standard error. Considering LSM, the z-values for skewness and kurtosis were -1.54 and 0.0006 respectively. This indicates that the dependent variable is normally distributed as they fall

between the range of -1.96 and +1.96 (refer to **Appendix 16** (both figures)). Analogously, for internationalization success, taking this logic into account, the skewness and kurtosis values were -1.95 and 0.0004. Again, in this case, the values fall between the previously mentioned range and can be considered as normally distributed. For a graphical representation of the distribution, the histograms and Q-Q (quantile-quantile) plots are presented next (refer to **Appendix 16** (both figures)).

Taking the first graphical representation into account for LSM, the frequency distribution (histogram) indicates that the data more or less falls within the parameters of the bell-shaped curved indicating that the data is most likely sampled from a normal distribution. For Q-Q plot, the x-axis plots the actual sample of the data whereas the y-axis plots the predicted values assuming that the data was sampled from a normal distribution. There is a solid line which runs diagonally on the graph and in an ideal normal distribution scenario the values of the x- and y axis would be equal, and the observations would sit on the solid line with little deviation. This can be observed in the Q-Q plot of LSM indicating normal distribution.

Considering the histogram representation for internationalization success, on one hand, the observations doesn't fall under the precinct of the bell-shaped curve and seems to be a bit skewed on the left (negatively skewed). On the other hand, things look different on the Q-Q plot as the observations are very much positioned in and around the diagonal solid line. Given this ambiguity, the final test which would be taken into account for the test of normality is the statistical test of Kolmogorov-Smirnov (KS), which is presented in **Appendix 17**.

Considering the alpha of .05, the p-value of KS test for LSM is 0.2 which is greater than .05. This implies that the alternative hypothesis can be rejected and LSM is normally distributed. Similarly for internationalization success, the p-value is .06 which is greater than .05, indicating normal distribution. Taking everything into account, the conclusion is as follows:

Table 9: Conclusion Normal Distribution

Variables	Condition fulfilled (Histogram)	Condition fulfilled (Q-Q plot)	Condition fulfilled (KS test)	Subjective final verdict
LSM	Yes	Yes	Yes	**Normal distribution**
Internationalization success	No	Yes	Yes	**Normal distribution**

Other assumptions which needs to be fulfilled for regression analysis are:

1. The expected mean error of the regression model is zero.
2. The variance of the errors is constant, i.e., establishing homoscedasticity.
3. The errors are independent, i.e., no autocorrelation. Although it has to be mentioned that it is not relevant for cross-sectional data but rather time-series data.
4. The regression model can be expressed in a linear manner.

To begin with **the first assumption (1)**, in other words, for to be able to prove that the mean error of the regression model is zero, firstly the unstandardized residuals and unstandardized predicted values needs to be saved in SPSS. This is depicted in **Appendix 18**. The values appear in the output file of SPSS which is depicted in **Appendix 19**. The main idea is to copy the errors up and transfer them to a spreadsheet. If the summation of the values leads to zero, then the assumption is fulfilled. The total sum resulted in zero in this case and thus the assumption is fulfilled.

The **second assumption** can be investigated by plotting the predicted values against the residuals. The depicted of the scatterplot can be found in **Appendix 20.** If the plot shows a pattern (as depicted in the fig. 28 below), it implies that the variance is not constant.
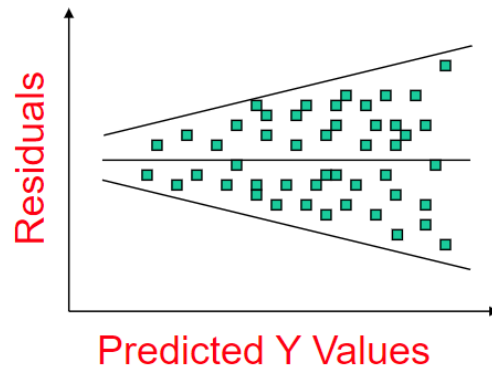
Figure 28: Exemplary pattern

The scatterplot as shown in **Appendix 20** in this case do not seem to portray any pattern and the error terms indicates that the fitted model is appropriate. It must be noted that that this is only a visual inspection, and a statistical test should shed more light on this topic. Breusch-Pagan test is the statistical test which can be taken into consideration here but unfortunately SPSS does not support it. For this a workaround (refer to **Appendix 21**) has been made by creating a new variable. This has been computed by squaring the residual value and naming it "SquareRes". This was mainly done to get rid of the negative values and achieve more standardization.

The new variable created was used as the dependent variable from here onwards and the independent variable was regressed on it. The idea of homoscedasticity is that the residual values do not increase with the increasing values of independent variable, which in other words imply that the independent variable do not affect the residual term. The test was re-run using the new dependent variable (SquareRes) and from ANOVA (refer to **Appendix 22**) it was observed whether the independent variable had any significant effect on the dependent variable or not. The ideal situation here would be not to observe any significant effect, i.e., with increasing values of independent variable, the dependent variable does not change drastically. The p-value of ANOVA was considered decisive here. For the Breusch-Pagan test, the following presumption needs were taken into consideration:

H0: The data is homoscedastic → $p < 0.05$
H1: The data is heteroscedastic → $p > 0.05$

The p-value (0.004, as seen in **Appendix 22**) indicates that it is less than 0.05 and thus enough evidence to reject the alternative hypothesis. Thus, it was concluded that the data was homoscedastic as previously assumed in the graphical representation as well.

The presence of autocorrelation **(third assumption)** was determined by the Durbin Watson (DW) test (refer to **Appendix 23**). A rule of thumb is that the DW test statistic values in the range of 1.5 to 2.5 are considered relatively normal. Values outside this range could, however, be a cause for concern. As the value of 2.251 falls within this range, this assumption was also met.

Linear relationship between dependent and independent variable is the **last assumption** which needs to be assessed. For this a scatter matrix was plotted (refer to **Appendix 24**).

The assessment showed that the relationship was fairly linear as no of curvy linear relationship or strange pattern was be observed. For example, the pattern of a rainbow or the letter U. As no strange pattern or curve was observed, the relationship was assumed to be fairly linear. Hence, this assumption was also met.

The final results of all the assumptions testing is consolidated in table 12 next:

Table 10: Compiled results of assumptions testing

Assumptions	Condition met? (Yes / No)
1. The expected mean error of the regression model is zero.	Yes
2. The variance of the errors is constant, i.e., establishing homoscedasticity.	Yes
3. The errors are independent, i.e., no autocorrelation.	Yes
4. The regression model can be expressed in a linear manner	Yes
5. Normal distribution of the model	Yes

5.4. Multicollinearity

In regression analysis it is assumed that the independent variables can be correlated to the dependent variable but the independent variables amongst themselves should not have significant levels of correlation. The independent construct LSM in this case is one single entity but this construct was developed by calculating means of seven underlying LSM dimensions. In order to be entirely convinced and not to have any diminishing ability of LSM to predict the dependent variable, multicollinearity amongst these constructs were assessed. To achieve this, firstly the Pearson's correlation matrix (refer to **Appendix 25**) was produced. This should provide the first information in order to detect any potential multicollinearity problems.

The values above did not show any correlation coefficient values which can be considered as having a strong correlation (Schober et al., 2018). They mainly fell under the category of having moderate correlation.

Absolute Magnitude of the Observed Correlation Coefficient	Interpretation
0.00–0.10	Negligible correlation
0.10–0.39	Weak correlation
0.40–0.69	Moderate correlation
0.70–0.89	Strong correlation
0.90–1.00	Very strong correlation

Figure 34: Schober et al. 2018

Another way of determining multicollinearity in the regression analysis is by looking at the Variance Inflation Factor (VIF). For this analysis, the unitary LSM construct was replaced by the other seven underlying constructs of LSM as independent variables. Refer to **Appendix 26** for the VIF values. VIFs range from 1 upwards. The numerical number for VIF indicates (in decimal notation) how much of the variance (i.e., the standard error squared) is inflated to every coefficient. A VIF of 1.9, for example, indicates that the variance of a specific coefficient is 90% higher than what would be expected if there was no multicollinearity, that is, if there had been no interaction with other predictors (Dodge, 2008; Everitt & Skrondal, 2010).

The following is a general rule for understanding the variance inflation factor (Dodge, 2008; Everitt & Skrondal, 2010):

- 1 indicates that there is no correlation.
- Moderately correlated is defined as a score between 1 and 5.
- Highly linked if the number is more than 5.

The exact level of a VIF that creates problems is a point of contention. What is known is that when the VIF progresses, the regression findings become less trustworthy. In general, a VIF greater than 5 shows strong correlation and should be considered concerning. Some writers recommend a threshold of 2.5 or more as a more cautious level (Dodge, 2008; Everitt & Skrondal, 2010). The VIF in this case was even lower in comparison with the cautious level of 2.5. Thus, multicollinearity was not considered a concern for further analysis.

5.5. Implementation framework (moderated regression analysis)

For the purpose of testing the hypotheses mentioned in chapter 4, moderated regression analysis was chosen as the overarching statistical methodology. As it is already evident that the data was scrutinized thoroughly in advance with the means of scale validation and reliability checks, assumptions testing and multicollinearity checks. To begin, the obtained survey data was examined using a linear regression analysis to determine the relationship between LSM and internationalization success (H1). This linear regression investigation permitted the association between the dependent variable (internationalization success) and the independent variable to be estimated (LSM). The independent variable (LSM) and the control variables were incorporated into the model as well, and the explained variance was calculated. Moreover, the influence of domestic network tie strength (H2), foreign network tie strength (H3), market uncertainty (H4a), and technological uncertainty (H4b) on the LSM-Internationalization Success link was probed.

Following the directions of Krüger et al. (2012), the moderated regression analysis was performed using a continuous moderator variable. To examine the impact of the continuous moderator, the cross-product component of the LSM and each Moderator's z-standardized data were incorporated in the framework. (3) Following that, the relevant moderator variable (market uncertainty) was added into the structure. The partial F coupled with the eventual change in R^2 was then statistically tested to see if market uncertainty alters the LSM-Internationalization Success relationship. Analogously, the cross-product term of the remainder of the moderators (models 4, 5 & 6) were included and again the subsequent partial F with the resulting change in R^2 was examined, in order to find out whether or not a moderating effect existed or not. In model 7, all the constructs were included to check for causal inferences.

6. Results
6.1. Descriptive statistics

In table 13 and figure 36 below, the means, standard deviations, and correlation matrix (Pearson correlation coefficient r) of the variables are provided:

Descriptive Statistics

	Mean	Std. Deviation	N
Internationalization Success	4.2613	.52947	59
Market Uncertainty	3.8390	.51646	59
Technology Uncertainty	4.4873	.41373	59
Domestic Network Tie Strength	3.1864	1.10254	59
International network Tie Strength	3.8079	.93915	59
Domestic Network Size	5.14	3.008	59
International Network Size	7.14	3.893	59
Duration of International Activities	3.390	1.5230	59
Pre-internationalization Phase	1.29	1.274	59
Position seniority	4.17	1.724	59
Development stage	1.66	.576	59
LSM	3.9839	.38562	59

Table 13: Mean & SD

Correlations

Pearson Correlation

	Internationalization Success	Market Uncertainty	Technology Uncertainty	Domestic Network Ties	International network ties	Domestic Network Size	International Network Size	Duration of International Activities	Pre-internationalization Phase	Position Seniority	Development Stage	LSM
Internationalization Success	1											
Market Uncertainty	.012	1										
Technology Uncertainty	.208	-.025	1									
Domestic Network Ties	.031	.046	-.001	1								
International network ties	.130	.113	-.029	,448**	1							
Domestic Network Size	,271*	-.077	-.044	,394**	.121	1						
International Network Size	.156	.148	.049	.222	,438**	,297*	1					
Duration of International Activities	.048	-,374**	-.119	-.080	-.013	-.104	-.002	1				
Pre-internationalization Phase	.090	.249	-.017	.084	.244	.062	.034	-,406**	1			
Position Seniority	.142	-.177	-.148	-.050	.109	-.051	.050	,539**	,331*	1		
Development Stage	.000	-.027	-.055	-.035	.048	-.003	.159	.163	-.029	.076	1	
LSM	,552**	.158	.148	.099	.069	.157	.171	-.119	-.039	.013	.093	1

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Figure 36: Pearson's Correlation Coefficient

Correlation in its most primitive form is about understanding the strength of association between variables and what direction they are associated with. So, does one variable increase as the other increases or vice-versa? It cannot directly be used to determine a causal relationship, but it rather provides a mere strength of association and direction.

The strength of a correlation is denoted and dependent upon correlation coefficient r and previous research has shown many possibilities of strength categorization (Cohen, 1992). The categorization which will be used here, has already been mentioned in sec. 5.4. For the sake of completeness, it is mentioned here (table 14) once again, which has been proposed by Schober et al. (2018):

Table 14: Categorization Correlation (Schober et al., 2018)

Correlation coefficient r	Interpretation
0.00 – 0.10	Negligible
0.10 – 0.39	Weak
0.40 – 0.69	Moderate
0.70 – 0.89	Strong
0.90 – 1.00	Very strong

The correlation coefficients found in the correlation matrix all range between weak to moderate classifications and is thus not a matter of concern. The variables whose correlation coefficients fall under the classification of moderate are briefly discussed next as the conclusion interpretation made is heavily influenced by context of the variables of the study. LSM and internationalization success seems to covary and is significant at 1% level. This study at the first place anticipates this relationship and the reality that they covary is a good sign. For the moderate association between International Network Tie Strength (InNTS) and International Network Size can be logically explained. The variable InNTS was constructed by asking the respondents regarding their international contacts in conjunction to the interaction's frequency, duration, and intimacy. It can be assumed that the more contacts they know (i.e., the network size), the more international tie strength they establish. Pre-international phase was determined by subtracting the startup's year of formation from their first international sales market entry. There were many startups in the sample who from their very inception engaged internationally and did not have any effective pre-domestic phase. Thus, on many occasions, the pre-phase and the actual duration of international activities evened each other out. Finally, similar kind of logic can be applied to the association between position seniority and duration of international activities. Most of the respondents in the sample were founders and the firms who internationalized immediately after formation had similar score. Thus, their association is not irrational.

6.2. Hypothesis Testing.

The table presented below encapsulates the results of the moderated regression analysis, and on the basis of this, the findings of the hypothesis testing are discussed next.

Table 15: Moderated Regression Analysis

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Independent variable (one-tailed)							
LSM	0.577***	0.555***	0.554***	0.503***	0.558***	0.497***	0.434**
Moderator variables (one-tailed)							
Market Uncertainty		-0.017	-0.016	-0.004	-0.035	0.024	-0.013
Technology Uncertainty		0.164†	0.165†	0.171†	0.159†	0.173†	0.156†
Domestic Network Tie Strength		-0.177†	-0.176†	-0.189†	-0.189†	-0.145	-0.158
International Network Tie Strength		0.116	0.116	0.131	0.103	0.121	0.099
Interaction term (one-tailed)							
LSM * Market Uncertainty			-0.005				0.11
LSM * Technology Uncertainty				0.116			0.117
LSM * Domestic Network Tie Strength					0.065		0.223*
LSM * International Network Tie Strength						-0.174†	-0.331*
Control Variables (two-tailed)							
Pre-internationalization Phase	0.258	0.231	0.231	0.238	0.239	0.201	0.222
Duration of International Activities	0.311	0.292	0.292	0.307	0.282	0.327	0.336
Domestic Network Size	0.187	0.264*	0.265*	0.293*	0.272*	0.266*	0.303*
International Network Size	0.013	-0.024	-0.025	-0.036	-0.015	-0.024	-0.001
Position Seniority	-0.103	-0.078	-0.077	-0.073	-0.087	-0.050	-0.078
Development Stage	-0.090	-0.085	-0.084	-0.070	-0.082	-0.054	-0.026
Reliability							
R^2	0.394	0.441	0.441	0.451	0.445	0.464	0.506
Adjusted R^2	0.311	0.310	0.295	0.308	0.3	0.324	0.333
R^2 Change	0.394	0.441	0.441	0.451	0.445	0.464	0.506
F	4.745***	3.373**	3.027**	3.151**	3.071**	3.312**	2.931**

*** $p \leq 0.001$ (0.1%); ** $p \leq 0.01$ (1%); * $p \leq 0.05$ (5%); † $p \leq 0.1$ (10%).

HI: *Higher degrees of leanness is positively associated to internationalization success.*
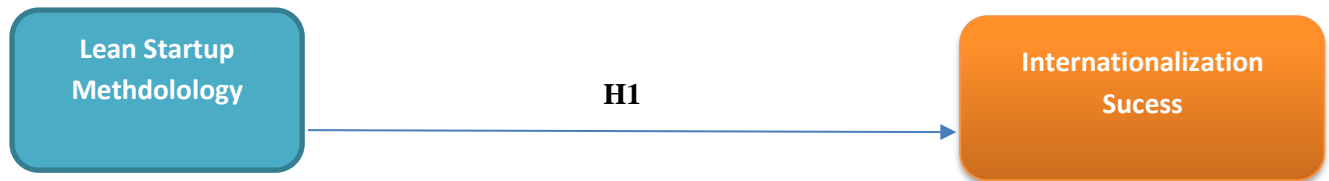
In model 1, the independent variable LSM, along with the control variables (pre-internationalization phase, duration of international activities, domestic- & international network size, position seniority and development stage) were regressed upon the dependent variable internationalization success. 39.4% (=R^2) of the variation in internationalization success was explained by the independent variable (Lean Startup Methodology). The regression equation is thus as follows:
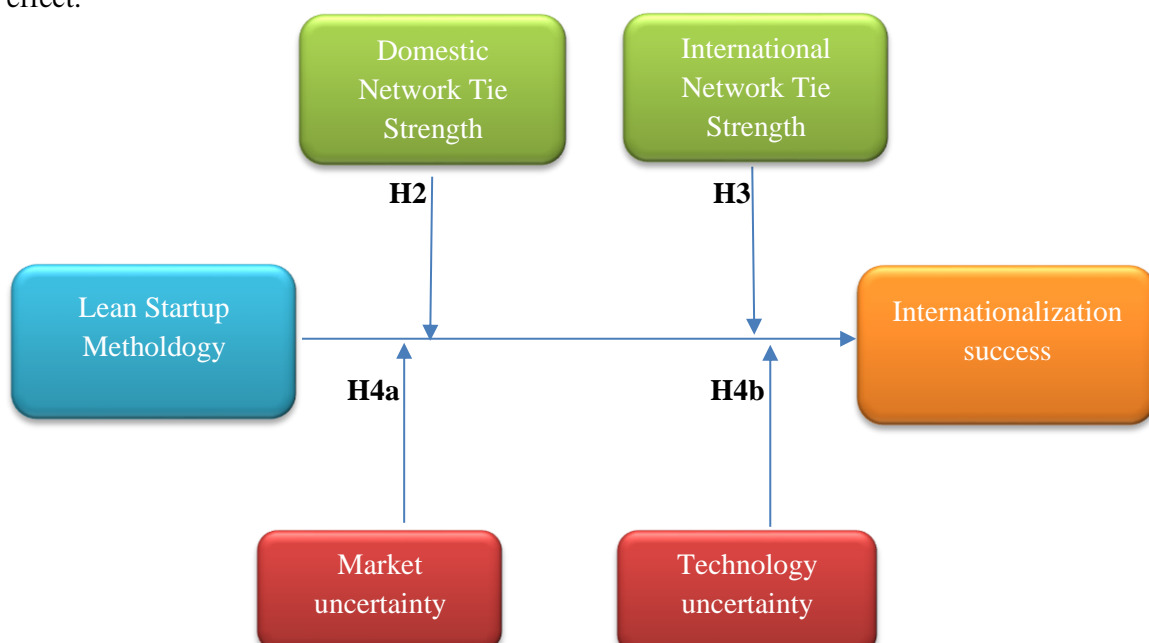
Internationalization success = β_0 + β_1(LSM) + β_2(pre-internationalization phase) + β_2(duration of international activities) + β_3(domestic network size) + β_4(international network size) + β_5 (position seniority) + β_6(development stage).

Taking the standardized coefficients into account, the equation was re-formulated to:

Internationalization success = 2.752E-15 (= 2.751 * 10^-15) + .577(LSM) + .258(pre-internationalization phase) + .311(duration of international activities) + .187(domestic network size) + .013(international network size) - .103(position seniority) - .090(development stage).

Holding all other variables constant, for every additional degree of startups orientating towards lean startup methodology, internationalization success increases by 0.577 on average.

In addition to that, what is very important is that whether the relationship was significant or not. There was enough evidence to reject null-hypothesis ($\beta = 0$), and thus it can be inferred that higher degrees of leanness is positively associated to internationalization success (H1: ß ≠ 0; p = .000009 (two-tailed) → p = .000009/2 = .0000045 (one-tailed); standardized β coefficient = .577; p ≤ 0.001). Support was not only found in model 1, results in models 2, 3. 4, 5, 6 & 7 showed strong, robust, and highly significant relationship between LSM and internationalization success (all at 0.1% level). Another step in the study was to assess the influence of possible moderators. A significant change in the direction or size of the "LSM-Internationalization Success" association would result from a genuine moderator effect.

H2: *The effectiveness of the "Lean Startup Methodology – Internationalization Success" is positively moderated by the stronger inter-firm relationship to domestic networks. The stronger the inter-firm relationship to domestic network, the stronger is the likelihood to internationalization success.*

In model 5, the interaction term "LSM * Domestic Network Tie Strength" was added, and it led to a R^2 increase by 5.1% (0.445 (R^2 model 5) – 0.394 (R^2 model 1)) but unfortunately the positive moderating impact of domestic network tie strength on "LSM-Internationalization Success" was found not be significant (standardized β coefficient = 0.065; p = .279 (one-tailed) > 0.1). Therefore, there was not enough evidence to reject null-hypothesis (β = 0), and thus it cannot be inferred that the stronger the inter-firm relationship to domestic network, the stronger is the likelihood to internationalization success

H3: *The effectiveness of the "Lean Startup Methodology – Internationalization Success" is negatively moderated by the stronger inter-firm relationship to international networks. The stronger the inter-firm relationship to international network, the weaker is the likelihood to internationalization success.*

In model 6, the interaction term "LSM * International Network Tie Strength" was added. The regression equation which was taken into account was:

Internationalization success = β0 + β1(LSM) + β2(pre-internationalization phase) + β2(duration of international activities) + β3(domestic network size) + β4(international network size) + β5 (position seniority) + β6(development stage) + β7(market uncertainty) + β8(technology uncertainty) + β9(domestic network tie strength) + β10(international network tie strength) + **β11 (LSM*international network tie strength)**

Taking the standardized coefficients into account, the equation was re-formulated to:

Internationalization success = .013 + .497(LSM) + .201(pre-internationalization phase) + .327(duration of international activities) + .266(domestic network size) - .024(international network size) - .050(position seniority) - .054(development stage) + .024(market uncertainty) + .173(technology uncertainty) - .145 (domestic network tie strength) + .121 (international network tie strength) **- .174 (LSM*international network tie strength)**

When there is a stronger inter-firm relationship to international network, the probability of attaining more internationalization success through lean startup methodology decreases by 0.174 on average holding all other variables constant.

Furthermore, the significance of this relationship was also scrutinized. There was enough evidence to reject null-hypothesis (β = 0), and thus it was inferred that the effectiveness of the "Lean Startup Methodology – Internationalization Success" is negatively moderated by the stronger inter-firm relationship to international networks (H1: ß ≠ 0; p = .173 (two-tailed) → p = .173/2 = .0865 (one-tailed); p ≤ 0.1; standardized β coefficient = -.174). It also needs to be reiterated that the robustness of this model was also verified in model 7, where all the variables were inserted. In model 7, the interaction effect was again found to be significant at alpha levels of 5%, in contrast to 10% in model 6 (H1: ß ≠ 0; p = .051 (two-tailed) → p = .051/2 = .0255 (one-tailed); p ≤ 0.05; standardized β coefficient = -.331). Compared to model 6, the negative effect on internationalization success was reinforced as this time the probability of attaining internationalization success through lean startup methodology would decrease by 0.331 on average holding all other variables constant, in comparison to .174 in model 6. In conclusion, model 7 can be considered a robustness check of the moderation

effect. Furthermore, a significant increase of R^2 was observed from 46.4% in model 6 to 50.6 in model 7.

H4: The effectiveness of the "Lean Startup Methodology – Internationalization Success" is moderated by market and technological uncertainty. The higher the market (H4a) and technological uncertainty (H4b), the higher is the likelihood to internationalization success.

In model 3 and model 4, the interaction terms "LSM *market uncertainty" and "LSM *technology uncertainty" was added, and it led to a R^2 increase by 4.7% (0.441 (R^2 model 3) – 0.394 (R^2 model 1)) and 5.7% (0.451 (R^2 model 3) – 0.394 (R^2 model 1)) respectively but unfortunately the positive moderating impact of market- and technology uncertainty on "LSM-Internationalization Success" was found not be significant ((market uncertainty → standardized β coefficient = -.005; p = .484 (one-tailed) ≥ 0.1); (technology uncertainty → standardized β coefficient = .116; p = .183 (one-tailed) ≥ 0.1)). Therefore, there was not enough evidence to reject null-hypothesis (β = 0), and thus it could not be inferred that the effectiveness of the "Lean Startup Methodology – Internationalization Success" is moderated by market (H4a) and technological (H4b) uncertainty positively.

Finally in model 7, all the variables were included, and it resulted in a R^2 change to 50.6% from the initial 39.4% in model 1. One interesting observation which can be detected here is the fact that the interaction term of "LSM * Domestic Network Tie Strength" becomes statistically significant here at alpha levels of 5 % (standardized β coefficient = .223; p = .03 (one-tailed) ≤ 0.05). Even though the moderation effect of domestic network tie strength became statistically significant here, but the robustness of this test is questionable. Having mentioned this, it was decided to adhere to the statistical insignificance of this interaction effect and concluding it as of partially supportive nature. To sum up, all the models demonstrate that greater internationalization success can be achieved through adhering to the methods of Lean Startup. Even though having strong international network tie strength at the first glance appears to be beneficial however, new businesses may not always have sufficient resources, and collaborating with worldwide network entails considerable cooperation and knowledge absorption expenses, which might occasionally exceed the benefits. This point seems to be quite plausible here as the results indicate this impediment.

7. Discussion

Lean startup gained traction as a pivotal concept for business practice and product management among the academia and entrepreneurship institutions. Despite its critical acclaim, the lean startup approach has received scant attention in the domain of internationalization, particularly in the field of internationalization accomplishment. As a result, it is possible to overlook the prospects of both these elements. Therefore, the aim of this master thesis was focused on understanding these research strands by means of providing empirical evidence on the following research question:

What is the effect of lean startup methodology (LSM) on the internationalization's success of new high-tech ventures?

The next sections would discuss each hypothesis which was postulated encompassing this topic and will strive to expand into in more depth on how the degree of LSM influences internationalization success. The table (16) presented next quickly summarizes the hypotheses and whether they empirically supported or not:

Table 16: Findings

Hypotheses	Supported / Partially Supported / Not Supported
1. Higher degrees of leanness is positively associated to internationalization success	*Supported*
2. The effectiveness of the "Lean Startup Methodology – Internationalization Success" is positively moderated by the stronger inter-firm relationship to domestic networks. The stronger the inter-firm relationship to domestic network, the stronger is the likelihood to internationalization success.	*Partially Supported*
3. The effectiveness of the "Lean Startup Methodology – Internationalization Success" is negatively moderated by the stronger inter-firm relationship to international networks. The stronger the inter-firm relationship to international network, the weaker is the likelihood to internationalization success.	*Supported*
4. The effectiveness of the "Lean Startup Methodology – Internationalization Success" is moderated by market and technological uncertainty. The higher the market (H4a) and technological uncertainty (H4b), the higher is the likelihood to internationalization success.	*Not Supported*

Concerning the first hypothesis, empirical evidence shows that the entrepreneurial firms adhering to the lean startup approach was significantly successful during internationalization. By taking the perspective of the theory-based view (hereinafter TBV (Felin & Zenger, 2017; Harms & Schwery, 2019), a concept in which an entrepreneur develops an initial theory about a business practice and then refines it through experimentation, resulting in a more nuanced theory) into account, LS attributes enables entrepreneurs to cultivate more accurate conceptualizations about international customer value. The idea is that the more closely entrepreneurs' conceptions resemble the real world, the more informed their judgments will be. By becoming acquainted with foreign clients, entrepreneurs are able to direct their emphasis to a sector deemed critical to startups (Harms & Schwery, 2019; Maurya,

2012). From the TBV point of view, during the early stages of developing an international business, entrepreneurs first select the questions which serves as their primary motivators in international evaluations. A second important benefit of picking a set of key focus areas is that entrepreneurs are perhaps in the state to formulate hypotheses regarding variables within the state and their causal linkages. Experimental learning originates with these speculations or assumptions. Through experimental learning, entrepreneurs are able to contemplate and build generalizable knowledge (Harms & Schwery, 2019; Miner et al., 2001). In this case, the applicability of this generalizable knowledge is speculated to have legitimacy in the international market as well. Additionally, hypothesis-based experimentation enables entrepreneurs to identify legitimate international possibilities and, in the process, shy away from the ventures which appear to be false positives and false negatives (Camuffo et al., 2020; Harms & Schwery, 2019). Given the experimental approach, you are usually bringing to light signals that show the probability of gains or losses in the form of prospective returns. As experimentation is a vital part of LSM, the experimentation affine and inquisitive entrepreneurs can more consistently and stringently examine the potential and are able to acquire more detailed information about the real distribution of potential profits, and in the process are able to make better judgments on whether to drop, alter, or further engage in the foreign endeavor (Camuffo et al., 2020; Harms & Schwery, 2019).

Engagement with customers is crucial to LSM. It can be theorized that early international stakeholder participation may open new avenues for entrepreneurs who is inclined towards experimentations. For instance, entrepreneurs, who are already informed about what is technologically feasible, interact with customers in social experiments to find out about new opportunities (Gemmell et al., 2012; Harms & Schwery, 2019). Entrepreneurs who deliberately construct new opportunities to match their interests and capabilities have the advantage of increased odds of internationalization success. Additionally, experimentation produce data that entrepreneurs use to track the results of their actions. This notion of data generation was a part of the survey question and the results revealed that the startups where overwhelmingly in favor of this. Validation, which represents the data-driven process of decision-making, is a core component of this system. Human biases are less prevalent when decisions are based on facts rather than feelings (Eisenmann et al., 2011; Harms & Schwery, 2019; York & Danes, 2014). Thus, validation serves to provide entrepreneurs with an objective look at the overseas business.

Under the realm of Lean Startup, once an evidence is validated, it can be utilized as a tool for learning. The knowledge acquired by an organization and its iterative learning process is heavily endorsed by the Lean Startup proponents. It is undeniable that the amplification of organization - wide learning and iterative knowledge transfer is a critical component of implementing an internationalization strategy. Organizational learning may very well be characterized as a transformation in a company's knowledge given the plethora of encountered events, which then results in growth of sustainable nature (Sekliuckiene et al., 2018). This facilitates the generation of new ideas, a flexible response to external circumstances, a profitable utilization of market possibilities, and the accumulation of a competitive edge (Bingham & Davis, 2012, p. 611). Additionally, enhanced organizational knowledge has been shown to lower the risks of foreignness and newness liabilities (Bingham, 2009; Rhee, 2002). One research finding identified two distinct learning mechanisms which can help to mitigate these liabilities. These mechanisms can be classified as direct and indirect learning mechanisms, where the former is used by firms to accumulate their own knowledge based on experiments or mistakes (often of better quality; time consuming), and the latter is learned through others' experiences (allows for time flexibility but less generalizable). Another facet of learning which strengthens the probability of internationalization success is the concept of learning sequences (several, recurrent knowledge generation by entering foreign countries sequentially and thus more learning), popularized by Bingham (2009) and Bingham & Davis (2012). They found out that, startups which were more

improvisational in entering foreign markets had less success than the ones who were sequential and less improvisational. Thus, according to the researchers, less improvisation is necessary for choosing international markets; hence an ordered country sequence is preferable, while greater improvisation is better for reacting to unpredictable developments (Autio et al., 2000; Bingham, 2009; Crossan, 1998), which in the process further helps in nullifying the liabilities of foreignness and newness. This research did not delve into sequential market entry processes but rather tried to reveal by providing empirical evidence, that these learning processes generates iterative organizational knowledge and subsequently contributes to internationalization success.

To put things into perspective, this research provides scientifically verifiable evidence that adopting a Lean Startup approach during internationationalization contributes to internationalization success. This is also consistent with the extant literature mentioned above. Entrepreneurs can fulfill their time and budget constraints by implementing Lean Startup practices since they can avoid costly failures by intervening early in development (Harms & Schwery, 2019; Hayes, Wheelwright, & Clark, 1988). These reforms are made possible by early consumer involvement and the deployment of clear hypotheses. Experimentation contains information that may be used to overcome decision-making distortions in a lot of circumstances (Eisenmann et al., 2011; Harms & Schwery, 2019; York & Danes, 2014). Additionally, these data allow for experimental learning and iterative knowledge transfer, which entrepreneurs may utilize to update their idea on how to produce value in order to achieve success in internationalization. The schematics of how the commitment to Lean Startup induces internationalization success is depicted in the fig. 37 below:
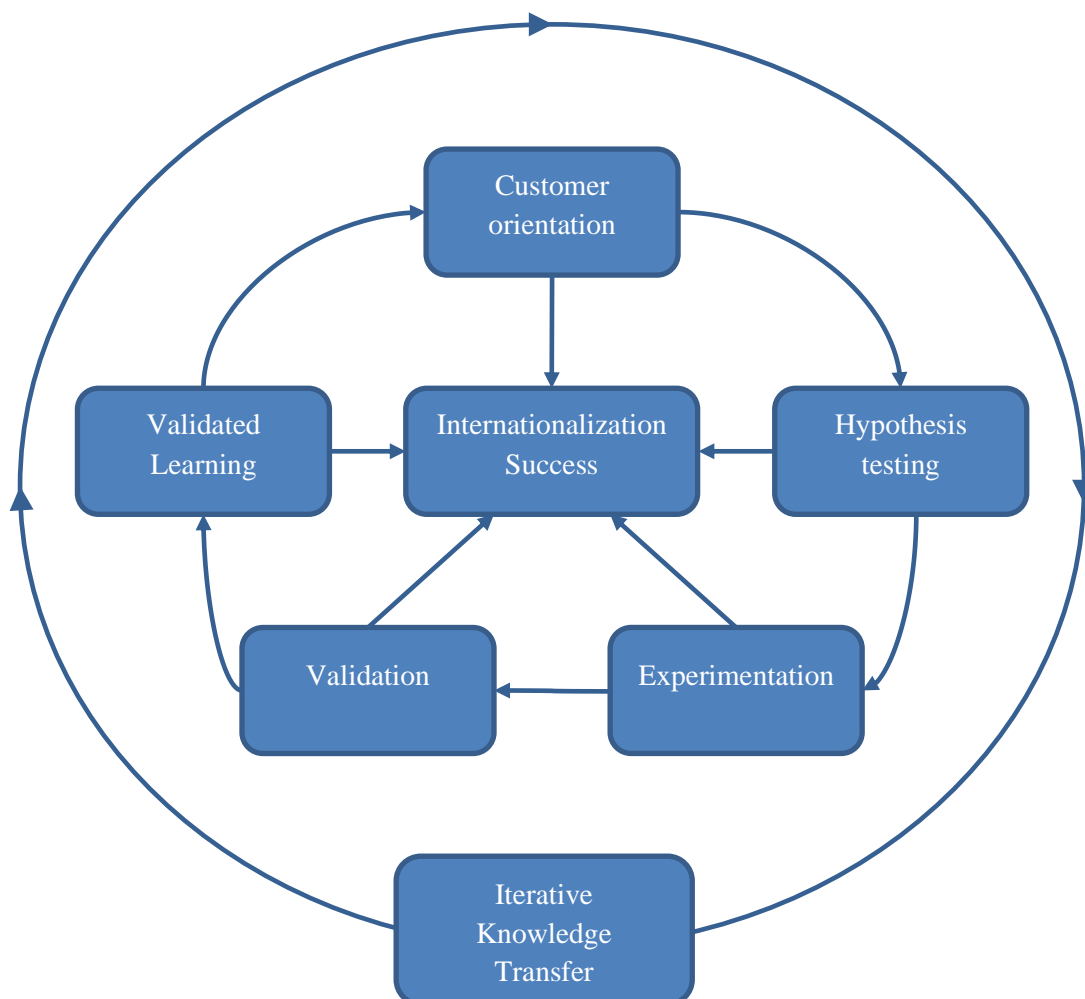

Figure 37: Path to Internationalization Success using LSM

In conjunction to the second and third hypothesis, i.e., whether the "LSM – Internationalization Success" is positively (domestic tie strength) and negatively (international tie strength) moderated by inter-firm networks, the empirical findings support these hypotheses (though partially supported for domestic network ties) and augments existing research in several ways.

First, while previous research has found both beneficial and detrimental effects of inter-firm networks for early internationalizers (e.g., Bembom, 2018; Coviello & Munro, 1997; Sepulveda & Gabrielsson, 2013), this thesis expands on that work by incorporating the LSM domain and examining whether inter-firm networks are favorable or not for aspiring startups' foreign venture performance. Studies contend that stonger ties to inter-firm networks may impede the internationalization of startups since they obstruct information flow (Bembom, 2018; Sepulveda & Gabrielsson, 2013), restrict opportunity exploration for entrepreneurs (Mort & Weerawardena, 2006) and have negative reputational effects (Bembom, 2018; Coviello & Munro, 1997). It should be pointed out that the rationale of information obstruction and theorizing for opportunity exploration are in direct conflict with Lean Startup dimensions. Based on these findings, an additional line of inquiry is proposed in which disadvantages are suggested to be more frequent in international inter-firm ties and that these limitations hinder the success of startups when venturing overseas.

The study lends more vigor to prior research by taking into consideration the national and international inter-firm networks perspective simultaneously. Prior research indicates that companies can benefit from their domestic connections as they gain knowledge and utilize this knowledge to strengthen their foreign ties (Bembom, 2018; Milanov & Fernhaber, 2014). But omitting to examine the synergy between national and international ties, the conclusions drawn could be skewed (Bembom, 2018; Milanov & Fernhaber, 2014). Thus, this analysis complements Presutti et al's (2007) study which only focuses exclusively on the influence of international relationships on firm's success, neglecting the domestic side of the picture. In addition to that, the findings in this study concur partially to the advantageous utility of domestic inter-firm ties, similar to the previous research as exemplified by Blomstermo et al. (2004). They demonstrate that having stronger ties with a domestic partner who operates globally can help the nascent firm in acquiring more knowledge (= in alignment with lean startup's knowledge dissemination and learning) of international operation and thus being more successful while internationalizing. Data from this study revealed evidence that the size of the domestic network (as controls) is significant in all six statistical models and the moderation effect was concluded as partially significant (refer to model 7). In a similar vein, some studies justified effective internationalization by having access to foreign intercompany ties (i.e., rich global market awareness which contains details related to socio-, cultural and political trends (Bembom, 2018; Musteen et al., 2014; Uzzi, 1997)), but this study disapproves this notion and substantiates the argument that geographic distance between contacts increases the per unit costs of knowledge acquisition and transfer costs (Bell & Zaheer, 2007), as a result depleting foreign venture performance. Empirical evidences found in model 6 and model 7 bolsters this claim.

Concerning the last hypothesis, i.e., LSM – Internationalization Success is contingent upon market and technology uncertainty (the more the technology and market uncertainty, the better is the success implication), this presumption seems not to hold in this case. The main thought process behind this conjecture that the net advantage of Lean Startup is contingent upon the expenses and gains for acquiring a unit cost of information. As Lean Startup is heavily invested upon gaining knowledge faster through for e.g., experimentation, customer orientation etc., it was hypothesized that under the circumstances of internationalization and given the high-tech context of the startups, where market and technology uncertainty is high, the entrepreneurs would be far more stimulated to be committed to the lean startup approach and thus acquiring more knowledge (= more learning and thus uncertainty

reduction) through the process by being faster. As the rate of knowledge acquisition increases, the per unit cost of knowledge acquisition decreases. It seems like that this speculation is false positive (the assumption seemed to be plausible theoretically but in practicality this is not the case). Under the circumstances of internationalization and given startups' high-tech contextual background, the implications encompassing decreasing returns to experimentation was forgotten (Harms & Schwery, 2019; Sull, 2004). For the source of diminishing returns, Harms & Schwery (2019) and Sull (2004) explains that it is the experiment creep which emerges when the experiment in question goes on for extended periods, costs excessively, or does not offer clear cut answers to certain uncertainties. But interestingly, if that was the case, models 3 and 4 should have indicated a negative significant impact on the "LSM – Internationalization Success" link given the context of heightened market uncertainties due to internationalization (market uncertainty) and amplified technology uncertainty given the startups' high-tech perspective. Finally, it could be that the measurement scale was not appropriate enough to measure the uncertainties in light of their contextually severe circumstances.

8. Limitations, direction of future research, and implication

The study of factors that influence the internationalization success of a new venture is a complex research undertaking. Despite the good work that went into conducting the research and gathering the data, however, it still comes with some inherent restrictions. The most important limitations and subsequently the direction of future research are introduced next. Even though the data show geographic variability of the respondent's origin, i.e., spanning across three continents (83.05% in Europe, 8.47% in North America, and 8.47% in Asia), the majority of the data stems from Europe. It also needs to be pointed out that the sample size was small. This implies that the representativeness of the sample and its global applicability should be administered by taking special precautions. It could be that the startups from a different continent experiences different circumstances and thus utilizes alternative tactics. Thus, the direction of future research could either aim at generating a representative sample where the proportions of the variability among the continents are equitable or strive to gather a sample, perhaps between two continents where the cultural and socio-economic contexts are different. For e.g., Europe Vs Asia.

Another component which could have performance implications within the lean startup approach is the contingencies related to the funding background. Startups mostly rely on venture capital or in other words venture capitalists are there go-to when it comes to funding their innovative ideas. Venture capitals can be characterized between independent venture capital (IVC) and corporate venture capital (CVC). Independent venture capitalists, or IVCs, are mainly private partnerships that are financed by institutions with vast quantities of available money, such as individuals with high net worth, insurance companies, public and private pension funds, foundations or even university financial endowments that invest in high-risk investments in hopes of earning high profits (Sahlman, 1990). The stand-alone investment vehicle of existing companies that invest on behalf of their corporate parent in new ventures are corporate venture capitalists, or CVCs (Chemmanur, Loutskina & Tian, 2014). CVCs and IVCs vary in their ability to produce value for a start-up venture. IVCs are more benefit driven and appear to be more frequent participants in the IPO market and can therefore be assumed to have better relationships with institutional investors, experts, and financial analysts. On the other hand, CVCs are much more strategically invested, and they play a recognition role because of their superior business experience by conveying a reliable signal to the market about the entrepreneurial firm's potential prospects. These variations between the types of VCs could translate into systemic differences between startups supported by CVC or those supported by IVCs on their performance aspects. Future research can account for this and investigate the interplay of funding backed up by IVC and CVC on the internationalization success of these ventures.

Finally, it is essential to bear in mind that the effectiveness of the results depends on the entrepreneur's interpretation and viewpoint. Considering that the two main points of view differ from the entrepreneur and the researcher, there may be perceptions that are not accurate and there could be misinterpretations of the elements, especially when considering the divergent points of view (Starbuck & Mezias, 1996). In order to remedy this, future research can incorporate quantitative evaluations of founders' and managerial perspectives with qualitative data in order to offer more clarity on the statistical significance of the factors investigated in this study.

With regards to implication for practice, this research can serve as a guideline or a toolbox for not only high-tech ventures but also for other scalable ventures looking to internationalize with no prior experience in internationalization. Additionally, finding a solution to the topic of how to enhance one's chances of succeeding in an unpredictable international surrounding is not only important for entrepreneurs but also critical for a wide range of stakeholders, including investors, bigger corporations, and policymakers. As a result, empirically verifying the link between LSM and

internationalization success in the entrepreneurial setting is a critical addition to practice. Realistically speaking, the results should encourage entrepreneurs to examine if LSM is appropriate in their environment for establishing and assessing their venture overseas. In a similar vein, entrepreneurial incubators may find justification for introducing the technique to their enterprises to assist their expansion, and venture capitalists may view this as a guidance towards evaluating the possibilities of success of a possible investment target. A collaborative endeavor that seeks to spread the focus of the work and enhance its depth will be enthusiastically received by the academic and practitioner communities.

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International markets are dangerous but promising!
Do you want to succeed?

Dear participants,

You are invited to participate in a survey, entitled **"Internationalization of High-Tech Startups"**.

The study is being conducted by Max Mahmud, **Master's student** of **Business Administration (Faculty of Behavioral, Management and Social Sciences (BMS))** at the **University of Twente** (Drienerlolaan 5, 7522 NB, Enschede, the Netherlands) as a part of his final project.

The researcher is investigating a method which advocates developing products that consumers have already demonstrated they desire, so that a market will already exist as soon as the product is launched. As opposed to developing a product and then hoping that demand will emerge. This rationale of the method has been proven very successful among startups in various studies for the domestic market but its applicability in entering a foreign market is unknown. The purpose of this study is to examine which processes from the **Approach** can be pursued by **Tech Startups** during their entry into **international markets** and to understand their impact on the **Internationalization Success**. Your participation in this online survey is extremely valuable and will help researchers better interpret **successful**

internationalization strategies of **Tech Startups**. By participating in this survey, you benefit from the insights and best course of action derived from other **Tech Startups**.

Thank you very much for contributing to our research project.

Yours sincerely,
Max Mahmud
(on behalf of ESS, University of Twente)

Follow this link to the Survey:
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The data collected will only be used within the project's scope for academic purposes only and will not be transferred to third parties.

In the survey we will also ask for individual-related information (e.g., age, gender). Answering these questions is voluntary. Participating in the survey is possible without indicating your name and without registration. All information is thus anonymous and highly confidential.

The data collected will be saved on the servers of our software provider (Qualtrics) until the end of the data collection period, which is August 2021 the latest; they will be encrypted and secured. The Qualtrics software fully complies with the latest General Data Protection Regulation (GDPR) requirements, see https://www.qualtrics.com/gdpr/.

While responding, your answers can be changed anytime. In addition, you have the rights of access, rectification, erasure (right to be forgotten), restriction of processing, data portability, to object, and not to be subject to a decision based solely on automated processing, including profiling. In addition, you can revoke your agreement with this data privacy statement anytime.

For these matters and for all other related questions, please contact the Qualtrics team by email

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from the insights and best course of action derived from other **Tech Startups**. Furthermore, all completed survey will be considered for our **Raffle**, where you can win **one of ten 25 € Amazon vouchers (worth 250 €)** which can be redeemed internationally. Get an opportunity to learn more about the **Approach** by answering the survey questions.

Thank you very much for contributing to our research project.

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Follow this link to the Survey:
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Or copy and paste the URL below into your internet browser:
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Raffle Consideration: at the end of the survey, you will find a field where you can enter your permanent email address if you wish to receive the study results and take part in the raffle draw. The winner will be picked randomly in August 2021 and will be contacted via email for further steps.

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Appendix 2: Landing Page for Survey Instrument

Appendix 3: Operationalization

Constructs	Definitions	Literature sources for scale construction
Independent variables → Lean Startup Methodology		
Hypothesis testing	The technique for formulating, evaluating, and validating theories	Adapted from Schwery (2018) whose findings are inspired from: Sykes & Dunham (1995), p.414 Eisenmann et al., (2011), p.1 Ries (2011), p.119
Customer orientation	Firm's pursuit in finding customer's actual pain points	Adapted from Schwery (2018) whose findings are inspired from: Rübling (2016) Lindberg et al., (2011), p.8 and p.4
Experimentation	Experimentation as a vital instrument for MVP	Adapted from Schwery (2018) whose findings are inspired from: Honig & Hopp, (2016) p.89 Cui et al., (2016) Rübling (2016)
Prototyping	A part of the experimentation approach for MVP, in order to reduce costs and facilitate learning	Adapted from Schwery (2018) whose findings are inspired from: Rübling, (2016) Cui et al., (2016) Tanev et al. (2015), p.9
Validation	Pursuit for the validation of theories through utilization of acceptable metrics and data-driven scientific experiments	Adapted from Schwery (2018) whose findings are inspired from: Rübling (2016) Kerr et al., (2014), p. 35 Maurya, (2012)
Knowledge transfer	Approach to use the acquired deep insights via knowledge dissemination for the execution of product development.	Adapted from Schwery (2018) whose findings are inspired from: Cui et al., (2016) Calantone & Cavusgil (2002), p. 520
Validated learning	Process of demonstrating empirically that a team has discovered valuable truths about a startup's present and future business prospects	Adapted from Schwery (2018) whose findings are inspired from: Calantone & Cavusgil (2002), p. 520
Iteration	Process of rapidly translating ideas into products, learning the customer's reaction to the products, and recognizing how to enhance or reshape those ideas iteratively	Adapted from Schwery (2018) whose findings are inspired from: Cui et al. (2016) Eisenmann et al., 2011, p.1
Dependent variables → internationalization success		
Customer satisfaction	Subjective assessment of customer satisfaction in new international markets	Adapted from Vorhies & Morgan (2005), p. 92 whose findings are inspired from:

		Fornell et al. (1996)
Market effectiveness	The degree to which the firms' international market-based goals had been achieved	Adapted from Vorhies & Morgan (2005), p. 92 whose findings are inspired by their previous work: Vorhies & Morgan (2005)
Current profitability	The degree to which the firm is achieving their international financial goals and overall productivity	Adapted from Vorhies & Morgan (2005), p. 92 whose findings are inspired from: Morgan, Clark & Gooner (2002), Last two items adapted from Nummela, Sarenketo & Puumalainen (2004), p. 64
Moderator variables		
National inter-firm tie strength	Interaction level of firms based on frequency, duration, and intimacy in relation to domestic linkages	Adapted from Bembom (2018), p. 92 whose findings are inspired from: Collins & Clark (2003, Smith et al. (2005). Zimmermann et al. (2009)
International inter-firm tie strength	Interaction level of firms based on frequency, duration, and intimacy in relation to international linkages	Adapted from Bembom (2018), p. 92 whose findings are inspired from: Collins & Clark (2003, Smith et al. (2005). Zimmermann et al. (2009)
Market uncertainty	Perceived levels of market turbulence	Adapted from Schwery (2018) whose findings are inspired from: Jaworski & Kohli (1993)
Technology uncertainty	Perceived levels of technology turbulence	Adapted from Schwery (2018) whose findings are inspired from: Jaworski & Kohli (1993)
Control variables		
Pre-internationalization phase: 1. Founding year 2. Date of first foreign market entry 3. Venture stage 4. Total number of years active in international activities	1.Pre-internalization phase is mainly determined through difference between year of founding and first foreign market entry. 2.Additional checks to filter out a matured organization and detect whether overseas entry took place within 3 years of inception. 3.Implications of prolonged international involvement.	Adapted from Bembom (2018), p. 116 - 123 whose findings are inspired from: Autio et al. (2000) Schwens et al. (2018) Gerschewski et al. (20015 Also, adapted from Schwery (2018) whose findings are inspired from: Scott & Bruce (2018)
Domestic Network Size International Network Size	Size of the network (both national and international) can impact the success of a foreign venture	Adapted from Bembom (2018), p. 116 - 123 whose findings are inspired from: Gerschewski et al. (2015)
Position seniority	Long seniority positions can have detrimental impact on the planning of suitable long-term internationalization strategies	Adapted from Bembom (2018), p. 116 - 123 whose findings are inspired from: Miller (1991)

| Duration of international activities | Whether being active internationally for a prolonged time has an effect or not | Adapted from Bembom (2018), p. 59 |
| Development stage | Whether different development stages of the startup where they are currently at has an effect or not. Also filtering out those startups who is beyond stages "maturity". | Scott & Bruce (1987) |

Appendix 3A: Original items, Alterations, and corresponding Argumentations

6. Please indicate the maturity of your company?

- Early growth: we have developed the products/services and also realized sales to early adopters.
- Rapid growth: we have accelerated growth and customer adoption.
- Maturity: we have an established customer base and flattening growth.
- Other, please state: _____

Original Items	Adjusted Items	Argumentations
Schwery (2018, p. 90): How far are you with building a business around this technology? - Idea development: we created the idea for the company and initiated prototype development. - Startup: we created the 1st generation of the products/service with pre-market screening - Early growth: we have refined the products/services and also realized sales to early adopters. - Rapid growth: we have accelerated growth and customer adoption. - Maturity: we have an established customer base and flattening growth Scale adopted from Schwery's (2018, p. 90) own-developed scale where the items of the scale is inspired from the literary findings of Scott & Bruce (1987) & Pittsburgh's future (2018). Schwery did not directly take it from an established scale. Literature findings where the above-mentioned question is based upon: 1. Scott & Bruce (1987): - Inception: The main efforts will hinge around developing a commercially acceptable product and establishing a	Please indicate the maturity of your company? - Early growth: we have developed the products/services and also realized sales to early adopters. - Rapid growth: we have accelerated growth and customer adoption. - Maturity: we have an established customer base and flattening growth. - Other, please state: _____	The opening statement has been rephrased and the word selection "maturity" was utilized. The adjustments were made since Schwery's research context was different. This paper focusses on firm's internationalization based on lean principles. Given this context, stages "idea development" and "startup" is ignored since they already have a product in the international market. The degree of maturity is more relevant in this case. The companies who have moved past the "maturity" stage will be omitted for further analysis since once they reach this stage, they cannot be considered a startup anymore.

place for it in the marketplace.

- Survival: If a company has reached this stage, it is potentially a workable business entity. As the business expands the financing emphasis will swing to working capital and the need to finance increased inventories and receivables.
- Growth: By the time the firm reaches this stage it should be profitable but is unlikely to generate cash for the owner. It will be ploughed back into the business to help finance the increased working capital demands. More time will have to be spent on coordinating the efforts of the functional managers.
- Expansion: Budgetary control, regular management reports and decentralized authority accompanied by formalized accounting systems are the order of the day. The need to systemize most administrative functions will be a fundamental to survival through this stage.
- Maturity: it is important to realize that unlike the conventional lifecycle concept the company is still growing in the maturity phase. Most companies in this stage are on the verge of moving out of being small businesses.

Pittsburgh's future (2018):

- Idea development: creation of idea for company and beginning of prototype development.
- Startup: creation of 1st generation product and initial market testing
- Early growth: refinement of the product & sales to early adopters
- Rapid growth: accelerating growth & customer adoption
- Maturity: established customer base and flattening growth

7. Please answer the following questions that relate to you personally:

- Are you a founder of the current company?
- What is your current position in the company?
- How long have you been working in your current position?

Original Items	Adjusted Items	Argumentations
Bembom (2018, p. 123): Bitte beantworten Sie folgende Fragen, die sich auf Ihre Person beziehen. - Sind Sie der Gründer Ihrer derzeitigen Unternehmen? - Welche Position haben Sie aktuell in Ihrem derzeitigen Unternehmen? - Wie lange arbeiten Sie bereits in Ihrer derzeitigen Position? Scale adopted from Bembom's (2018, p. 123) own-developed scale where the items of the scale is inspired from the literary findings of Miller (1991, p. 34). Bembom did not directly take it from an established scale. Literature findings where the above-mentioned survey question is based upon: Miller (1991, p. 34): "It has often been argued that an organization's strategy and structure must be tailored or matched to the challenges posed by its environment. Our research shows that this match is less likely to be achieved by long-tenured CEO's than by their counterparts with less tenure. It also suggests that the failure to match strategy and environment hurts financial performance. More specifically, CEO tenure related inversely to the prescribed match between organization and environment, especially in uncertain settings and where ownership was concentrated. The match between environment and strategy was in turn positively related to financial performance." – Miller (1991, p. 34)	Please answer the following questions that relate to you personally: - Are you the founder of the current company? Yes/No - What is your current position in the company? - How long have you been working in your current position?	No rearrangements. The scale was originally in German and this has been translated to English (word-for-word translation). Except for that, everything else is unchanged. This change was made to take into account the universal comprehensibility of the survey. If it proves to be difficult for some of the participants to understand the English version of the survey, Bembom's scale can be applied in its original German form.

12. The following information refers to your company's network at the time of entering the most recent significant international market. The timeframe of entry refers to the first time you researched on developing an international market entry strategy up until the realization of first international sales. (Important: If you have no activity for any of the questions, please enter "0". Do not leave any of the fields blank).

12.1. How many home market/domestic business contacts[1] outside your company did you discuss critical international functions with?

12.2. How many international business contacts[2] outside your company did you discuss critical international functions with?

Original Items	Adjusted Items	Argumentations
Bembom (2018, p. 122): Die folgenden Informationen beziehen sich auf die Größe des Netzwerks Ihres Unternehmen zum Zeitpunkt des Eintritts in den vom Ihrem Unternehmen zuletzt erschlossenen Auslandsmarkt. Wichtig: Wenn Sie bei einer der der Fragen keine Aktivität haben, tragen Sie bitte „0" ein. Lassen Sie keines der Felder unausgefüllt. • Bitte geben Sie die Anzahl deutscher Geschäftskontakte außerhalb Ihrer Firma an (z.B. Kunden, Zulieferer oder sonstige Kontakte aus der Branche), mit denen Sie geschäftliche Angelegenheiten besprochen haben. • Bitte geben Sie die Anzahl internationaler Geschäftskontakte außerhalb Ihrer Firma an (z.B. Kunden, Zulieferer oder sonstige Kontakte aus der Branche), mit denen Sie geschäftliche Angelegenheiten besprochen haben. • Bitte geben Sie die Anzahl persönlicher Kontakte an (z.B. Freunde und Verwandte oder sonstige Kontakte außerhalb Ihrer Branche), mit denen Sie geschäftliche Angelegenheiten besprochen haben. Scale adopted from Bembom's (2018, p. 122) own-developed scale where the items of the scale is inspired from the literary findings of Zimmerman et al. (2009, p. 150) and Collins & Clark (2003, p. 744). With regards to the original scales which Bembom utilized as a part of his own scale generation, there are explanations on how the scale was constructed but the existence/trace of the actual survey questions and items are not clearly listed in a tabular form in both the studies. Literature findings where the above-mentioned question is based upon. As	The following information refers to your company's network at the time of entering the most recent significant international market. The timeframe of entry refers to the first time you researched on developing an international market entry strategy up until the realization of first international sales. (Important: If you have no activity for any of the questions, please enter "0". Do not leave any of the fields blank). • How many home market/domestic business contacts outside your company did you discuss critical international functions with? • How many international business contacts outside your company did you discuss critical international functions with?	• Bembon's scale translated from German to English. This change was made to take into account the universal comprehensibility of the survey. If it proves to be difficult for some of the participants to understand the English version of the survey, Bembom's scale can be applied in its original German form, with slight changes. • Changes to Bembom's opening statement → changed from "Größe des Netzwerks" to "your company's network". This change has been made to provide a consistent approach pertaining all the survey questions linked to 12.3. – 12.5. Only questions 12.1. and 12.2. is directly relevant for the size of the network, whereas the questions associated to 12.3., 12.4., and 12.5. are not related to network size but rather related to network strength. In addition to that, it has been also decided to analyze the largest international market a startup has recently entered and accordingly all the survey questions are composed (from 12.1. onwards) to adhere to this motive. • I have decided to remove the third item of Bembom's scale because it drifts away from the "company" focus to a focus on the private level. The study is not concerned in the private social contacts or ties of the CEO/founder, but rather the company contacts represented by the CEO/founder. → Focus on firm-level ties instead of private ties. • Bembom's (2018) study focused on German firms who internationalized and used the wording "Anzahl

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[1] Contacts include customers, suppliers, financial institutions, govt. agencies, alliance partner, competitors, or other contacts from the industry.

mentioned earlier, the trace of the actual survey questions and items could not be located in the studies but rather provides a brief overview on how it was constructed:

Zimmerman et al. (2009, p. 150):

"The survey includes two measures of network size: international network size and network size in general. Following Collins and Clark (2003), network size is obtained by asking respondents to indicate the number of people outside the firm with whom they discuss company business. International network size is a subset of network size and is captured in a similar manner, by asking respondents to indicate the number of internationally active people outside the firm with whom they discuss business-related matters" - (Zimmerman et al., 2009, p. 150)

Collins & Clark (2003, p. 744):

"Network size refers to the total number of contacts in a TMT's social network; larger networks comprise more ties. Each TMT member was asked to identify the total number of his or her contacts in each of the nine external and four internal categories. To create a company score for network size, we summed the number of social ties across the external and internal categories for each TMT and divided by the number of respondents" – Collins & Clark (2003, p. 744)

Here TMT refers to top management team. The external categories of actors are:
- External board member
- Suppliers
- Customers
- Financial institutions
- Competitors
- Alliance partners
- Govt. agencies
- Trade association
- Other external actors

The internal categories of actors are:
- Sales and marketing
- R&D
- Production & operation
- Other internal actors

deutscher Geschäftskontakte" in order to reflect the home/local/domestic market. This has been altered for this study as the samples are not only confined to German firms but could be located in other countries. So, this has been altered to give a universal applicability, for firms located elsewhere.
- I also decided to extend the range related to the external categories of actors inspired by the study of Collins & Clark (2003, p. 744) in order to give the survey participants a broad range of critical external actors whom they had contact with.
- Furthermore, critical business function was chosen instead of plain "geschäftliche Angelegenheiten" in order to help the participants to distinguish between essential and non-essential business functions affecting performance.

12.3. How often did you interact at the time of entry with: (1 = Rarely – 5 = several times a week)
- Your home market/domestic business contacts[2] with whom you have discussed critical international functions.
- Your international business contacts[2] with whom you have discussed critical international functions.

12.4. How long on average have you interacted at the time of entry with: (1 = less than an hour – 5 = 10 hours and above)

- Your home market/domestic business contacts[1] with whom you have discussed critical international functions.
- Your international business contacts[2] with whom you have discussed critical international functions.

12.5. How confidential was the information you shared at the time of entry with: (1 = Predominantly superficial information – 5 = Predominantly confidential information) Not confidential, slightly confidential, very confidential.

- Your home market/domestic business contacts[2] with whom you have discussed critical international functions.
- Your international business contacts[2] with whom you have discussed critical international functions.

Original Items	Adjusted Items	Argumentations
Bembom (2018, p. 122): Wie häufig interagierten Sie zum Zeitpunkt des Eintritts mit: (1 = mehrmals pro Woche – 5 = seltener) • Ihren deutschen Geschäftskontakten, mit denen Sie geschäftliche Angelegenheiten besprochen haben (z.B. Kunden, Zulieferer oder sonstige Kontakte aus der Branche)? • Ihren internationalen Geschäftskontakten, mit denen Sie geschäftliche Angelegenheiten besprochen haben (z.B. Kunden, Zulieferer oder sonstige Kontakte aus der Branche)? • Ihren persönlichen Kontakten, mit denen Sie geschäftliche Angelegenheiten besprochen haben (z.B. Freunde und Verwandte oder sonstige Kontakte außerhalb Ihrer Branche)? Wie lange interagierten Sie zum Zeitpunkt des Eintritts mit: (1 = erst seit kurzem – 5 = seit langer Zeit) • Ihren deutschen Geschäftskontakten, mit denen Sie geschäftliche Angelegenheiten besprochen haben (z.B. Kunden, Zulieferer oder sonstige	How often did you interact at the time of entry with: (1 = Rarely – 5 = several times a week) • Your home market/domestic business contacts[2] with whom you have discussed critical international functions. • Your international business contacts[2] with whom you have discussed critical international functions. How long on average have you interacted at the time of entry with: (1 = less than an hour – 5 = 10 hours and above) • Your home market/domestic business contacts[1] with whom you have discussed critical international functions. • Your international business contacts[2] with whom you have discussed critical international functions. How confidential was the information you shared at the time of entry with: (1 = Predominantly superficial information – 5 = Predominantly confidential information) Not confidential, slightly confidential, very confidential. • Your home market/domestic business contacts[2] with whom you have discussed critical international functions. • Your international business contacts[2] with whom you have discussed critical international functions.	• Bembon's scale translated from German to English. This change was made to take into account the universal comprehensibility of the survey. If it proves to be difficult for some of the participants to understand the English version of the survey, Bembom's scale can be applied in its original German form, with slight changes. • I have decided to remove the third item of Bembom's scale because it drifts away from the "company" focus to a focus on the private level. The study is not concerned in the private social contacts or ties of the CEO/founder, but rather the company contacts represented by the CEO/founder. → Focus on firm-level ties instead of private ties. • Bembom's (2018) study focused on German firms who internationalized and used the wording "Ihren deutschen Geschäftskontakten" in order to reflect the home/local/domestic market. This has been altered for this study as the samples are not only confined to German firms but could be located in other countries. So, this has been altered to give a universal applicability, for firms located elsewhere. • I have decided to remove the third item of Bembom's scale, i.e., "Ihren

Kontakte aus der Branche)?

- Ihren persönlichen Kontakten, mit denen Sie geschäftliche Angelegenheiten besprochen haben (z.B. Freunde und Verwandte oder sonstige Kontakte außerhalb Ihrer Branche)?

Wie vertraulich waren die Informationen, die Sie zum Zeitpunkt des Eintritts mit: (1 = überwiegend oberflächliche Informationen – 5 = überwiegend vertrauliche Information)

- Ihren deutschen Geschäftskontakten, mit denen Sie geschäftliche Angelegenheiten besprochen haben (z.B. Kunden, Zulieferer oder sonstige Kontakte aus der Branche)?
- Ihren internationalen Geschäftskontakten, mit denen Sie geschäftliche Angelegenheiten besprochen haben (z.B. Kunden, Zulieferer oder sonstige Kontakte aus der Branche)?
- Ihren persönlichen Kontakten, mit denen Sie geschäftliche Angelegenheiten besprochen haben (z.B. Freunde und Verwandte oder sonstige Kontakte außerhalb Ihrer Branche)?

Scale borrowed from Bembom's (2018, p. 122) own-developed scale where the items of the scale is inspired from the scales of Zimmerman et al. (2009, p. 151) and Collins & Clark (2003, p. 745). Note: the range of the Likert Scale in Collins & Clark's (2003) study is missing.

In the following, please refer to the survey questions of:

Zimmermann et al. (2009, p. 151)

- How often did you interact with your internationally active ties? (1 = once per year – 7 = twice a week)
- How long have you interacted with these international ties? (1 = only recently – 7 = for a long time)
- How "intimate" knowledge sharing is with these international ties? (1 = mostly superficial info – 7 = mostly intimate information)

Collins & Clark (2003, p. 2003)

persönlichen Kontakten" because it drifts away from the "company" focus to a focus on the private level. The study is not concerned in the private social contacts or ties of the CEO/founder, but rather the company contacts represented by the CEO/founder. → Focus on firm-level ties instead of private ties.

- I also decided to extend the range related to the external categories of actors inspired by the study of Collins & Clark (2003, p. 744) in order to give the survey participants a broad range of critical external actors whom they had contact with.
- Furthermore, critical business function was chosen instead of plain "geschäftliche Angelegenheiten" in order to help the participants to distinguish between essential and non-essential business functions affecting performance.

- On average, how often have you interacted with your critical contacts?
- On Average, how long have you known these critical contacts?
- On average, how close is your relationship with these contacts?

16. The following information refers to your company's most recent entry into a significant international market. Please evaluate the following statements in relation to the success of your company in that international market (1 = Strongly disagree; 5 = Strongly Agree)

Customer satisfaction:

- We are successful in delivering what our international customers want in this international market.
- When it comes to holding on to valued international customers abroad, we do well in this international market.
- We are effective in delivering more value to our international customers in this international market.
- Overall, our international customers perceive our products / services with great satisfaction in this international market.

Market effectiveness:

- We are regularly acquiring new international customers in the given international market.
- Current international customers abroad are contributors to increasing sales.
- Sales revenue in the given international market is growing quickly.
- With regards to international market share growth, our competitors cannot catch up with our tempo.

Current profitability:

- We are continuously reaching our international financial goals.
- Return on investment (ROI) are continuously high in this international market.
- Return on sales (ROS) are continuously high in this international market.
- The business unit(s) are performing profitably in this international market.
- Internationalization has had a positive effect on our company's profitability.
- In general, we are satisfied with our success in this international market.

Original Items	Adjusted Items	Argumentations
Vorhies & Morgan (2005, p. 92): Please evaluate the performance of your business over the past year (the next twelve months) relative to your major competitors. Seven-point scale running -3 ("much worse than competitors") to +3 ("much better than competitors")	Customer satisfaction: • We are successful in delivering what our international customers want in this international market. • When it comes to holding on to valued international customers abroad, we do well in this international market.	• Vorhies and Morgan's (2005) measures differs from the actual measures used in this study because the items from Vorhies and Morgan (2005) did not entail complete sentences, which could lead to ambiguous comprehensibility amongst

Customer satisfaction:
- Delivering what your customers want
- Retaining valued customers
- Delivering values to your customers
- Customer satisfaction

Market effectiveness:
- Acquiring new customers
- Increasing sales to existing customers
- Growth in sales revenue
- Market share growth relative to competitors

Current (anticipated) profitability:
- Reaching financial goals.
- Return on investment (ROI)
- Return on sales.
- Business unit profitability

Nummela, Sarenketo and Puumalainen (2004, p. 64, two items of the scale was borrowed):

The opening statement is not provided, but the items are as follows, which measures international performance by utilizing subjective measures:
- We have met our international market-share objectives.
- We have achieved the turnover objectives we set for internationalization.
- In general, we are satisfied with our success in the international markets.
- Internationalization has had a positive effect on our company's profitability.
- Internationalization has had a positive effect on our company image.
- Internationalization has had a positive effect on the development of our company's expertise.

Scale adopted from Vorhies & Morgan (2005, p. 92) and Nummela, Sarenketo and Puumalainen (2004, p. 64, two items were borrowed)

- We are effective in delivering more value to our international customers in this international market.
- Overall, our international customers perceive our products / services with great satisfaction in this international market.

Market effectiveness:
- We are regularly acquiring new international customers in the given international market.
- Current international customers abroad are contributors to increasing sales.
- Sales revenue in the given international market is growing quickly.
- With regards to international market share growth, our competitors cannot catch up with our tempo.

Current profitability:
- We are continuously reaching our international financial goals.
- Return on investment (ROI) are continuously high in this international market.
- Return on sales (ROS) are continuously high in this international market.
- The business unit(s) are performing profitably in this international market.
- Internationalization has had a positive effect on our company's profitability.
- In general, we are satisfied with our success in this international market.

participants.
- I also decided to adapt this measurement scale to a 5-point Likert scale instead of 7-point in order to achieve uniformity with the other scales used.
- The forecast measures of the "next twelve months" and comparability to competitors have been omitted as well in conjunction to make the survey questionnaire more simplistic and thus not overburdening the respondents. Furthermore, the study does not compare to other market players.
- Originally, the scales measured business performance, but this has been changed to integrate the internationalization context of business performance.
- Numella, Sarenketo & Puumalainen's (2004) scale measured international performance of a firm subjectively. I decided to include the two items as a part of the current profitability measure because the items were missing a direct profitability link in relation to internationalization. This addition made it more comprehensive.
- "Customers" changed to "international customers" for clarification reasons.

14. The following information refers to your company's most recent entry into a significant international market. Please judge the following statements relating to your company's environmental context of international market entry: (1 = Strongly disagree – 5 = Strongly Agree).

Market uncertainty:

- In our international market, customers' product preferences change quite a bit over time.
- Our international customers tend to look for new products all the time.
- We are witnessing demand for our products and services from international customers who never bought them before.
- New international customers tend to have product-related needs that are different from those of our existing international customers.
- In the international market, we cater to many of the same customers that we used to right after market entry.

Technology uncertainty:

- The technology in our industry is changing rapidly.
- Technological changes in the international market provide big opportunities in our industry.
- It is very difficult to forecast where the technology in our industry will be in the next 2 or 3 years.
- A large number of new international market entry strategy-making approaches have been made possible through technological breakthroughs in our industry.
- Technological developments in our industry are rather minor.

13. The following information refers to your company's most recent entry into a significant international market. Please judge the following statements relating to the processes of international market entry: (1 = Strongly disagree – 5 = Strongly Agree).

Hypothesis testing:

- We formulated a series of hypotheses about what the international market needs are and how best to deliver it.
- We translated the vision about the international market and its value proposition into falsifiable hypotheses.
- Among all the hypotheses in our business model, we tested and validated the riskiest assumptions first.
- We frequently design experiments to test hypotheses on our business model for the international market.

Customer orientation:

- It is important to gain deep market insight of the new international market (= talking directly to international customers) to better understand our customer's problem.
- When we developed the international market strategy, we always had the international customers in mind.

- We invested significant effort in understanding of the problem and learning about the international customers and its social context.
- It is important to gain a deep insight (= talking directly to international customers) into how our solution solves the customer problem.

Experimentation:

- We tested assumptions about the new international market from the beginning with potential international customers.
- We took an experimental approach that relied on frequent trial and error to find a suitable international market entry strategy.
- We tested our international market entry strategy with potential international customers before commercializing to the international market.
- We frequently design and run experiments on elements of our business model for the international market.

Prototyping:

- We used prototyping to test key assumptions about the viability of our international market entry strategy.
- Our international customers were frequently exposed to different international market entry approaches during the strategic development process.
- We used prototypes to validate assumptions about the international market and our business model specifications.
- In developing the international market entry strategy, we used the simplest way to define and test the required strategic actions.

Validation:

- We used metrics to measure the impact of our international market entry strategy on our international customers' behavior.
- We did not use data driven tests to improve our human judgement and overall decision making.
- We validated as many assumptions as possible about the viability of our international market entry strategy before expending enormous effort and financial resources.
- We have metrics available to test the international market entry strategy's acceptance by customers and the sales performance.

Knowledge transfer:

- We did not use information about our gained real international customers' needs in the development of the international market strategy.
- We actively transferred information gathered from real international customers to the development team.
- The transfer of information about international customers' needs and preferences took place rarely.
- We do not have specific mechanisms for sharing lessons learned in our company.

Validated learning:

- The company's ability to learn is considered as key to our competitive advantage.
- The basic values of our company include learning as key to improvement.
- Venture learning is an investment, not an expense.

- Learning in our company is a key commodity which is essential to guarantee organizational survival.

Iteration:

- We viewed new international market entry strategy-making approaches as cycles of experiments, learning and additional experiments.
- We did not try many different new international market entry strategy-making approaches before we found the right one.
- We engaged in many trial and error processes in developing an international market entry strategy, and thus had a complete understanding of the international market and its entry.
- We repeated the process of testing until all the key business model hypotheses were validated.

Original Items	Adjusted Items	Argumentations
Market and technology uncertainty		
Schwery (2018, p. 90): Think about your **last project** when you developed software, an app, web application and so on. Looking back at this project, judge the statements given in the next pages concerning the process and actions you applied to develop your digital product / service. Scale of Jaworski & Kohli (1993, p. 68): Market turbulence: • In our kind of business, customers' product preferences change quite a bit over time. • Our customers tend to look for new product all the time. • Sometimes our customers are very price-sensitive, but on other occasions, price is relatively unimportant. • We are witnessing demand for our products and services from customers who never bought them before. • New customers tend to have product-related needs that are different from those of our existing customers. • We cater to many of the same customers that we used to in the past. Technological turbulence • The technology in our industry is changing rapidly. • Technological changes provide big opportunities in our industry. • It is very difficult to forecast where the technology in our industry will be in the next 2 to 3 years. • A large number of new product ideas have been made possible through technological breakthroughs	Market uncertainty: • In our international market, customers' product preferences change quite a bit over time. • Our international customers tend to look for new products all the time. • We are witnessing demand for our products and services from international customers who never bought them before. • New international customers tend to have product-related needs that are different from those of our existing international customers. • In the international market, we cater to many of the same customers that we used to right after market entry. Technology uncertainty: • The technology in our industry is changing rapidly. • Technological changes in the international market provide big opportunities in our industry. • It is very difficult to forecast where the technology in our industry will be in the next 2 or 3 years. • A large number of new international market entry strategy-making approaches have been made possible through technological breakthroughs in our industry. • Technological developments in our industry are rather minor.	• Mario's (2018) opening statement differs from the opening statement of this study as Mario's focus group was software-based startups who produced digital products or services, whereas this study's focus group is high-tech ventures which involves a broader range of possible sectors compared to the sole software sector as included in the original study. • In addition to that, Mario's sample did not have any international undertaking. The international aspect has been applied here in the opening statement in order to achieve more conformity to the remainder of the survey questions. • The word selections "significant" and "most recent entry" were utilized in order to account for recall bias. • Statement 1 (market uncertainty): "kind of business" was adjusted to "international market" in order to fit the international context. • Statements 2, 3, 4 & 5 (market uncertainty): the word "international" was added in various instances in order to make it more clear and synchronized to the context. • Statement 6 (market uncertainty): was completely omitted as an objective connecting factor for international market was missing. • Statement 7 (technology uncertainty): "in the international market" was added which signifies the

in our industry. • Technological developments in our industry are rather minor.		innovation volatility / disruption of the international market. • Statement 9 (technology uncertainty): "product ideas" was replaced by "new international market entry strategy-making approaches" which should reiterate the survey participants of their entry strategies.

Original Items	Adjusted Items	Argumentations
Hypothesis testing		
Schwery (2018, p. 91): Hypothesis testing: • We formulated a series of hypotheses about what the market needs are and how best to deliver it. • We translated the vision about our product/service and its value proposition into falsifiable hypotheses. • Among all the hypotheses in our business model, we tested and validated the riskiest assumptions first. • We (rarely) frequently design experiments to test hypotheses on our business model (reverse coded) Scale borrowed from Schwery's (2018, p. 91) study. As there were no established scales found which fitted the content domain of the lean startup in relation to the first-order indicator "hypothesis testing", Schwery (2018) relied upon generating his own items inspired by the studies of Skyes & Dunham (1995, p. 414), Eisenmann et al. (2011, p. 1) and Ries (2011, p. 119). Some literature backings, as borrowed from Schwery (2018), for the generation of items for hypothesis testing are: • "Managers must see developing new sources of revenue as a process of discovery-proposing and testing a series of hypotheses about what the market needs and how best to deliver it." – Skyes & Dunham (1995, p. 414). → Item 1 in Schwery's scale. • "When following this approach, an entrepreneur translates her vision into falsifiable business model hypotheses, and then tests those hypotheses using a series of minimum viable products (MVPs). Each MVP	Hypothesis testing: • We formulated a series of hypotheses about what the international market needs are and how best to deliver it. • We translated the vision about the international market and its value proposition into falsifiable hypotheses. • Among all the hypotheses in our business model, we tested and validated the riskiest assumptions first. • We frequently design experiments to test hypotheses on our business model for the international market.	• Statement 1: "Market" was adjusted to "international market" to make it clearer to respondents. • Statement 2: "products/services" was adjusted to "international market" to fit the context of the opening statement, i.e., process of international market entry.

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represents the smallest set of activities needed to disprove a hypothesis." – Eisenmann et al. (2011, p. 1) → Item 2 in Schwery's scale.

- "When one is choosing among the many assumptions in a business plan, it makes sense to test the riskiest assumptions first." – Ries (2011, p. 119) → Item 3 in Schwery's scale.

Original Items	Adjusted Items	Argumentations
Customer orientation		
Schwery (2018, p. 91): Customer orientation: • It is important to gain deep market insight (= talking directly to customers) to better understand our customer's problem. • When we developed the solution we never (always) had the customer in mind (reverse coded). • We invested significant effort in understanding of the problem and learning about the user and its social context. • It is important to gain a deep insight (= talking directly to customers) into how our solution solves the customer problem. Scale borrowed from Schwery's (2018, p. 91) study. As there were no established scales found which fitted the content domain of the lean startup in relation to the first-order indicator "customer orientation", Schwery (2018) relied upon generating his own items inspired by the research backings of Lindberg et al. (2011, p. 8) and Rübling (2016, p. 39). Some literature backings, as borrowed from Schwery (2018), for the generation of items for customer orientations are: • "Supporting a comprehensive shared understanding of the problem addressed before the actual development process starts, in particular by learning about the user and its social context from different perspectives" - Lindberg et al. (2011, p. 8) → Item 3 in Schwery's scale. • "In creation theory on the other hand, opportunities are created as entrepreneurs act	Customer orientation: • It is important to gain deep market insight of the new international market (= talking directly to international customers) to better understand our customer's problem. • When we developed the international market strategy, we always had the international customers in mind. • We invested significant effort in understanding of the problem and learning about the international customers and its social context. • It is important to gain a deep insight (= talking directly to international customers) into how our solution solves the customer problem.	• Statement 1: "of the new international market" was added. • Statement 2: "customer" was adjusted to "international customer". • Statement 3: "user" was adjusted to "international customers". • Statement 4: "customers" was adjusted to "international customers". • All these above-mentioned adjustments were done to fit the context of the opening statement and also the research motive, i.e., processes of international market entry.

and observe, how consumers and markets respond (Alvarez & Barney, 2007). Thereby, creation theory allows for an integration of entrepreneurship theory and marketing theory, in particular of market-orientation, which has provided evidence for the integral role of understanding and fulfilling customer needs for many decades already" - Rübling (2016, p. 39) → Item 1 in Schwery's scale.

Original Items	Adjusted Items	Argumentations
Experimentation		
Schwery (2018, p. 91): Experimentation: • We tested assumptions about our new product/service from the beginning with potential customers. • We took an experimental approach that relied on frequent trial and error to find the right product solution. • We did not test our product/service with potential customers before commercializing to the market (reverse coded). • We frequently design and run experiments on elements of our business model. Scale borrowed from Schwery's (2018, p. 91) study. As there were no established scales found which fitted the content domain of the lean startup in relation to the first-order indicator "experimentation", Schwery (2018) relied upon generating his own items inspired by the research backings of Cui et al. (2016, p. 11, p. 20) on the impact of experimentation on NPD approach. Two items were directly taken from the scale developed by Cui et. (2016, p. 20) Some literature backings, and the scale of Cui et al. (2016, p. 20) as borrowed from Schwery (2018), for the items generation of experimentation are: "The measures for experimental NPD approach assess the degree to which a firm relies on frequent trial and error to find the right product solution; views the NPD process as cycles of experiments, learning, and additional experiments; and engages in trial and error before developing a complete understanding of the market and technology. The measures were developed based upon discussions in	Experimentation: • We tested assumptions about the new international market from the beginning with potential international customers. • We took an experimental approach that relied on frequent trial and error to find a suitable international market entry strategy. • We tested our international market entry strategy with potential international customers before commercializing to the international market. • We frequently design and run experiments on elements of our business model for the international market.	• Statement 1: "Our new product/service" was adjusted to "the new international market". • Statement 2: "Find the right product solution" was adjusted to "find a suitable international market entry strategy". • Statement 3: "Did not test our product/service" was adjusted to "tested our international market entry strategy". "Customers" to "international customers". • Statement 3: "Market" was adjusted to "international market". • All these above-mentioned adjustments were done to fit the context of the opening statement and also the research motive, i.e., processes of international market entry.

Lynn et al. (1996) and Thomke (2001)
"- Cui et al. (2016, p. 11)

The scale is as follows:
- We took an experimental approach that relied on frequent trial and error to find the right product solution. → item 2 in Schwery's scale.
- We viewed new product development as cycles of experiments, learning, and additional experiments.
- We engaged in the trial-and-error process in product development before we had a complete understanding of the market and technology. → item 3 in Schwery's scale.
- We tried many different product solutions before we found the right one.

Original Items	Adjusted Items	Argumentations
Prototyping		
Schwery (2018, p. 92): Prototyping: • We used prototyping to test key assumptions about technical viability. • Our customers rarely (frequently) interacted with prototypes during the development process (reverse coded). • We used prototypes to validate specific product/service features and business model specifications. • In developing the product/service we aim to use the simplest way to build and test our requested product features. Scale borrowed from Schwery's (2018, p. 92) study. As there were no established scales found which fitted the content domain of the lean startup in relation to the first-order indicator "prototyping", Schwery (2018) relied upon generating his own items inspired by the research backings of Tanev et al. (2015, p. 9) on linking the two research streams of lean and global tech. startups. Some literature backings, which inspired Schwery (2018), for the items generation of prototyping are: "The essence of the methodology consists of the translation of a specific	Prototyping: • We used prototyping to test key assumptions about the viability of our international market entry strategy. • Our international customers were frequently exposed to different international market entry approaches during the strategic development process. • We used prototypes to validate assumptions about the international market and our business model specifications. • In developing the international market entry strategy, we used the simplest way to define and test the required strategic actions.	• Statement 1: "about technical viability" was adjusted to "the viability of our international market entry strategy." • Statement 2: "international" was added before "customers"; "frequently interacted with prototypes during the development" was adjusted to "frequently exposed to different international market entry approaches during the strategic development process.". • Statement 3: "specific product/service features" was adjusted to "assumptions about the international market and our business model specifications". • Statement 4: "product/service we aim to use the simplest way to build and test our requested product features" was adjusted to "international market entry strategy, we used the simplest way to define and test the required strategic actions." • All these above-mentioned adjustments were done to fit the context of the opening statement and also the research motive, i.e., processes of international market entry.

entreprenewrial vision into falsifiable hypotheses regarding the solution and business model that is going to be used to deliver it. The hypotheses are then tested using a series of well-thought product prototypes that are designed to rigorously validate specific product features or business model specifications. (..)According to them one of the key aspects of the lean start-up approach is the focus on how to make prototype-based experiments ever more cost effective so that ventures do not need to raise as much money to pursue a range of alternative product ideas." – Tanev et al. (2015, p. 9, p. 12).

Original Items	Adjusted Items	Argumentations
Validation		
Schwery (2018, p. 92): Validation: • We used metrics to measure the impact of product/service improvements on customer behavior. • We did (not) use data driven tests to improve our human judgement and overall decision making (reverse coded) • We validated as many assumptions as possible about the viability of the product/service before expending enormous effort and financial resources. • We have metrics available to test the product/service acceptance by customers and the sales performance. Scale borrowed from Schwery's (2018, p. 92) study. As there were no established scales found which fitted the content domain of the lean startup in relation to the first-order indicator "validation", Schwery (2018) relied upon generating his own items inspired by the research backings of Kerr et al. (2014, p. 35) Some literature backings, which inspired Schwery (2018), for the items generation of validation are: "However, by quickly building a workable version with only the bare essentials, the MVP approach seeks to validate as many assumptions as possible about the viability of the final product before expending enormous effort and financial resources." - Kerr et al. (2014, p. 35). → Item 3 in Schwery's scale.	Validation: • We used metrics to measure the impact of our international market entry strategy on our international customers' behavior. • We did not use data driven tests to improve our human judgement and overall decision making. • We validated as many assumptions as possible about the viability of our international market entry strategy before expending enormous effort and financial resources. • We have metrics available to test the international market entry strategy's acceptance by customers and the sales performance.	• Statement 1: "product/service improvements on customer behavior" was adjusted to "our international market entry strategy on our international customers' behavior." • Statement 3: "viability of the product/service" was changed to "of our international market entry strategy". • Statement 3: "product/service" was adjusted to "international market entry strategy". • All these above-mentioned adjustments were done to fit the context of the opening statement and also the research motive, i.e., processes of international market entry.
Original Items	**Adjusted Items**	**Argumentations**
Knowledge transfer		

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Schwery (2018, p. 92):

Knowledge transfer:
- We used information about our gained real customers' needs in the development of the new product/service.
- We actively transferred information gathered from real customers to the development team.
- The transfer of information about customers' needs and preferences took place rarely (reverse coded)
- We have specific mechanisms for sharing lessons learned in our venture.

Scale borrowed from Schwery's (2018, p. 92) study. The items in this scale do not stem from an established scale but rather conceived with the help of prior research backings. In this case, two established scales were conjoined to form Schwery's scale. They are as follows:

Intraorganizational knowledge sharing (Calantone et al., 2002, p. 520):
- There is a good deal of organizational conversation that keeps alive the lessons learned from history.
- We always analyze unsuccessful organizational endeavors and communicate the lessons learned widely.
- We have specific mechanisms for sharing lessons learned in organizational activities from department to department (unit to unit, team to team). → Item 4 of Schwery's scale.
- Top management repeatedly emphasizes the importance of knowledge sharing in our company.
- We put little effort in sharing lessons and experiences.

Customer involvement as information source (Cui et al., 2017, p. 20):

During the new product development process:
- We used customers as a key information source.
- We actively transferred information gathered from our customers to the development team. → Item 2 of Schwery's scale.
- The transfer of information about customers' needs and

Knowledge transfer:
- We did not use information about our gained real international customers' needs in the development of the international market strategy.
- We actively transferred information gathered from real international customers to the development team.
- The transfer of information about international customers' needs and preferences took place rarely.
- We do not have specific mechanisms for sharing lessons learned in our company.

- Statement 1: "gained real customers' needs" was adjusted to "gained real international customers' needs"; "in the development of the new product/service" was adjusted to "in the development of the international market strategy".
- Statement 2: "from real customers" was altered to "from real international customers".
- Statement 3: "customers' needs" was adjusted to "international customers' needs".
- All these above-mentioned adjustments were done to fit the context of the opening statement and also the research motive, i.e., processes of international market entry

preferences took place frequently. → Item 1 of Schwery's scale
- We used information about our customers' needs in the development of the new product. → Item 1 of Schwery's scale.

Original Items	Adjusted Items	Argumentations
Validated learning		
Schwery (2018, p. 92): Validated learning: • The organization's ability to learn is not considered as key to our competitive advantage (reverse coded). • The basic values of our organization include learning as key to improvement. • Venture learning is an investment, not an expense. • Learning in our organization is a key commodity which is essential to guarantee organizational survival. Scale borrowed from Schwery's (2018, p. 92) study. The items in this scale stem from an established scale but some wording and phrases altered by Schwery (2018). They are as follows: Commitment to learning (Calantone et al., 2002, p. 520): • Managers basically agree that our organization's ability to learn is the key to our competitive advantage. • The basic values of this organization include learning as key to improvement. • The sense around here is that employee learning is an investment, not an expense. • Learning in my organization is seen as a key commodity necessary to guarantee organizational survival.	Validated learning: • The company's ability to learn is considered as key to our competitive advantage. • The basic values of our company include learning as key to improvement. • Venture learning is an investment, not an expense. • Learning in our company is a key commodity which is essential to guarantee organizational survival.	• Statements 1, 2 & 3: "organization" was changed to "company" in order to achieve uniformity.
Iteration		
Schwery (2018, p. 92, 93): Iteration: • We viewed new product/service development as cycles of experiments, learning and additional experiments. • We did not try many different product/service solutions before we found the right one. (reverse coded) • We engaged in many trial and error processes in product/service development	Iteration: • We viewed new international market entry strategy-making approaches as cycles of experiments, learning and additional experiments. • We did not try many different new international market entry strategy-making approaches before we found the right one. • We engaged in many trial and error processes in developing an international market entry strategy, and	• Statement 1: "new product/service development" was adjusted to "new international market entry strategy-making approaches". • Statement 2: "different product/service solutions" was changed to "different new international market entry strategy-making approaches". • Statement 3: "in product/service development before we had a complete

before we had a complete understanding of the market and technology.

- We repeated the process of testing until all the key business model hypotheses have been validated.

Scale borrowed from Schwery's (2018, p. 92) study. Schwery (2018) chose three items from the works of Cui et al. (2017, p. 20) and devised the last item based on the research findings of Eisenman et al. (2011, p. 1).

Experimental NPD approach (Cui et al., 2017, p. 20):

In new product development:
- We took an experimental approach that relied on frequent trial and error to find the right product solution.
- We viewed new product development as cycles of experiments, learning, and additional experiments. → Item 1 of Schwery's scale.
- We engaged in the trial-and-error process in product development before we had a complete understanding of the market and technology. → Item 3 of Schwery's scale.
- We tried many different product solutions before we found the right one. → Item 2 of Schwery's scale.

One of the literatures backing for the iteration item generation is:
"(..)Based on test feedback, an entrepreneur must decide whether to persevere with her proposed business model; pivot to a revised model that changes some model elements while retaining others; or simply perish, abandoning the new venture. She repeats this process until all of the key business model hypotheses have been validated through MVP tests." – (Eisenmann et al., 2011, p. 11) → Item 4 of Schwery's scale.

thus had a complete understanding of the international market and its entry.

- We repeated the process of testing until all the key business model hypotheses were validated.

understanding of the market and technology" was altered to "in developing an international market entry strategy, and thus had a complete understanding of the international market and its entry."

- All these above-mentioned adjustments were done to fit the context of the opening statement and also the research motive, i.e., processes of international market entry

1. The following survey requires to recall information from international market entries. Please answer the following question: Is your company currently active in international markets? (In the given context, active refers to all international activities that relate to your company's sales markets and not to procurement markets). If the answer is no, you can close the survey at this point and thank you for your time. If the answer is yes, we highly appreciate the time you will take to answer the following questions.

2. Name of the startup? Note: This is not a mandatory field.

3. Which year was the company founded?

4. Headquartered/based in which city?

5. Please state the sector you are operating in: _____

6. Please indicate the maturity of your company:

- Early growth: we have developed the products/services and also realized sales to early adopters.
- Rapid growth: we have accelerated growth and customer adoption.
- Maturity: we have an established customer base and flattening growth.
- Other, please state: _____

7. Please answer the following questions that relate to you personally:

- What is your age? _____
- What is your Gender? male / female /diverse
- Are you a founder of the current company?
- What is your current position in the company?
- How long have you been working in your current position?
- Is internationalization a part of your job?

8. In which year did the first international market entry of your company (in terms of sales market) take place?

9. In general, how many years have you been altogether internationally active with your company (in terms of the sales market)?

10. Please indicate the number of international markets your company currently operates in. International operation can be defined as exporting, licensing, franchising, joint venture, foreign direct investment, and wholly owned subsidiary.

For the next questions, consider the most recent entry into a significant international market with your products/services. It should be a market entry that:

- **is no longer than three years ago,**
- **already generate international sales,**
- **you intend to generate continuous, non-trivial revenue, and**

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- **is intended mostly for establishing sales.**

For example, please exclude occasional, international market transactions.

11. In which significant country did your company enter most recently?

12. The following information refers to your company's network at the time of entering the most recent significant international market. The timeframe of entry refers to the first time you researched on developing an international market entry strategy up until the realization of first international sales. (Important: If you have no activity for any of the questions, please enter "0". Do not leave any of the fields blank).

12.1. How many home market/domestic business contacts[2] outside your company did you discuss critical international functions with?

12.2. How many international business contacts[2] outside your company did you discuss critical international functions with?

12.3. How often did you interact at the time of entry with: (1 = Rarely – 5 = several times per week)
- Your home market/domestic business contacts[2] with whom you have discussed critical international functions.
- Your international business contacts[2] with whom you have discussed critical international functions.

12.4. How long on average have you interacted at the time of entry with: (1 = less than an hour – 5 = 10 hours and above)
- Your home market/domestic business contacts[1] with whom you have discussed critical international functions.
- Your international business contacts[2] with whom you have discussed critical international functions.

12.5. How confidential was the information you shared at the time of entry with: (1 = Predominantly superficial information – 5 = Predominantly confidential information) Not confidential, slightly confidential, very confidential.
- Your home market/domestic business contacts[2] with whom you have discussed critical international functions.
- Your international business contacts[2] with whom you have discussed critical international functions.

13. The following information refers to your company's most recent entry into a significant international market. Please judge the following statements relating to the processes of international market entry: (1 = Strongly disagree – 5 = Strongly Agree).

Hypothesis testing:

- We formulated a series of hypotheses about what the international market needs are and how best to deliver it.
- We translated the vision about the international market and its value proposition into falsifiable hypotheses.

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[2] Contacts include customers, suppliers, financial institutions, govt. agencies, alliance partner, competitors, or other contacts from the industry.

- Among all the hypotheses in our business model, we tested and validated the riskiest assumptions first.
- We frequently design experiments to test hypotheses on our business model for the international market.

Customer orientation:

- It is important to gain deep market insight of the new international market (= talking directly to international customers) to better understand our customer's problem.
- When we developed the international market strategy, we always had the international customers in mind.
- We invested significant effort in understanding of the problem and learning about the international customers and its social context.
- It is important to gain a deep insight (= talking directly to international customers) into how our solution solves the customer problem.

Experimentation:

- We tested assumptions about the new international market from the beginning with potential international customers.
- We took an experimental approach that relied on frequent trial and error to find a suitable international market entry strategy.
- We tested our international market entry strategy with potential international customers before commercializing to the international market.
- We frequently design and run experiments on elements of our business model for the international market.

Prototyping:

- We used prototyping to test key assumptions about the viability of our international market entry strategy.
- Our international customers were frequently exposed to different international market entry approaches during the strategic development process.
- We used prototypes to validate assumptions about the international market and our business model specifications.
- In developing the international market entry strategy, we used the simplest way to define and test the required strategic actions.

Validation:

- We used metrics to measure the impact of our international market entry strategy on our international customers' behavior.
- We did not use data driven tests to improve our human judgement and overall decision making.
- We validated as many assumptions as possible about the viability of our international market entry strategy before expending enormous effort and financial resources.
- We have metrics available to test the international market entry strategy's acceptance by customers and the sales performance.

Knowledge transfer:

- We did not use information about our gained real international customers' needs in the development of the international market strategy.

- We actively transferred information gathered from real international customers to the development team.
- The transfer of information about international customers' needs and preferences took place rarely.
- We do not have specific mechanisms for sharing lessons learned in our company.

Validated learning:

- The company's ability to learn is considered as key to our competitive advantage.
- The basic values of our company include learning as key to improvement.
- Venture learning is an investment, not an expense.
- Learning in our company is a key commodity which is essential to guarantee organizational survival.

Iteration:

- We viewed new international market entry strategy-making approaches as cycles of experiments, learning and additional experiments.
- We did not try many different new international market entry strategy-making approaches before we found the right one.
- We engaged in many trial and error processes in developing an international market entry strategy, and thus had a complete understanding of the international market and its entry.
- We repeated the process of testing until all the key business model hypotheses were validated.

14. The following information refers to your company's most recent entry into a significant international market. Please judge the following statements relating to your company's environmental context of international market entry: (1 = Strongly disagree – 5 = Strongly Agree).

Market uncertainty:
- In our international market, customers' product preferences change quite a bit over time.
- Our international customers tend to look for new products all the time.
- We are witnessing demand for our products and services from international customers who never bought them before.
- New international customers tend to have product-related needs that are different from those of our existing international customers.
- In the international market, we cater to many of the same customers that we used to right after market entry.

Technology uncertainty:
- The technology in our industry is changing rapidly.
- Technological changes in the international market provide big opportunities in our industry.
- It is very difficult to forecast where the technology in our industry will be in the next 2 or 3 years.
- A large number of new international market entry strategy-making approaches have been made possible through technological breakthroughs in our industry.
- Technological developments in our industry are rather minor.

15. The following information refers to your company's most recent entry into a significant international market. Please judge the following statements relating to your attitude towards the understanding about the international market your company has gained from learning it: (1 = Strongly disagree – 5 = Strongly Agree).

Learning Results:
- Overall, I believe that our company's gained understanding of the international market is good.
- Overall, I believe the effect of our company's gained understanding of the international market is positive.
- Overall, I believe that our company's gained understanding of the international market is helpful for business.
- Overall, I believe that our company's gained understanding of the international market entry will provide us the opportunity for improvement.

16. The following information refers to your company's most recent entry into a significant international market. Please evaluate the following statements in relation to the success of your company in that international market (1 = Strongly disagree; 5 = Strongly Agree)

Customer satisfaction:

- We are successful in delivering what our international customers want in this international market.
- When it comes to holding on to valued international customers abroad, we do well in this international market.
- We are effective in delivering more value to our international customers in this international market.
- Overall, our international customers perceive our products / services with great satisfaction in this international market.

Market effectiveness:

- We are regularly acquiring new international customers in this international market.
- Current international customers abroad contribute to increasing sales.
- Sales revenue in this international market is growing quickly.
- Regarding international market share growth, our competitors cannot catch up with our tempo.

Current profitability:

- We are continuously reaching our international financial goals.
- Return on investment (ROI) are continuously high in this international market.
- Return on sales (ROS) are continuously high in this international market.
- The business unit(s) are performing profitably in this international market.
- Internationalization has had a positive effect on our company's profitability.
- In general, we are satisfied with our success in this international market.

Appendix 5: KMO and Barlett's Test

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,534
Bartlett's Test of Sphericity	Approx. Chi-Square	1359,383
	df	496
	Sig.	,000

Figure 13: KMO & Barlett's Test

Appendix 6: Total Variance Explained

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6,986	21,830	21,830	6,986	21,830	21,830	3,555	11,111	11,111
2	3,501	10,939	32,769	3,501	10,939	32,769	3,185	9,954	21,065
3	2,966	9,268	42,037	2,966	9,268	42,037	3,157	9,865	30,930
4	2,487	7,772	49,809	2,487	7,772	49,809	2,967	9,271	40,201
5	2,142	6,692	56,502	2,142	6,692	56,502	2,947	9,210	49,411
6	1,853	5,790	62,292	1,853	5,790	62,292	2,644	8,262	57,673
7	1,692	5,162	67,453	1,692	5,162	67,453	2,513	7,854	65,528
8	1,507	5,023	72,476						
9	1,442	4,506	76,983						
10	,988	3,087	80,070						
11	,898	2,808	82,878						
12	,786	2,456	85,334						
13	,614	1,918	87,253						
14	,587	1,835	89,087						
15	,509	1,592	90,679						
16	,431	1,348	92,027						
17	,371	1,158	93,185						
18	,342	1,068	94,252						
19	,309	,965	95,217						
20	,263	,821	96,039						
21	,249	,778	96,817						
22	,185	,579	97,397						
23	,165	,515	97,912						
24	,130	,406	98,317						
25	,111	,347	98,664						
26	,100	,313	98,977						
27	,096	,300	99,277						
28	,077	,241	99,518						
29	,053	,167	99,684						
30	,044	,136	99,820						
31	,041	,127	99,947						
32	,017	,053	100,000						

Extraction Method: Principal Component Analysis.

Figure 14: Total variance explained

Appendix 7: Component Retention

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6,986	21,830	21,830	6,986	21,830	21,830	3,555	11,111	11,111
2	3,501	10,939	32,769	3,501	10,939	32,769	3,185	9,954	21,065
3	2,966	9,268	42,037	2,966	9,268	42,037	3,157	9,865	30,930
4	2,487	7,772	49,809	2,487	7,772	49,809	2,967	9,271	40,201
5	2,142	6,692	56,502	2,142	6,692	56,502	2,947	9,210	49,411
6	1,853	5,790	62,292	1,853	5,790	62,292	2,644	8,262	57,673
7	1,692	5,162	67,453	1,692	5,162	67,453	2,513	7,854	65,528
8	1,507	5,023	72,476						
9	1,442	4,506	76,983						
10	,988	3,087	80,070						
11	,898	2,808	82,878						
12	,786	2,456	85,334						
13	,614	1,918	87,253						
14	,587	1,835	89,087						
15	,509	1,592	90,679						
16	,431	1,348	92,027						
17	,371	1,158	93,185						
18	,342	1,068	94,252						
19	,309	,965	95,217						
20	,263	,821	96,039						
21	,249	,778	96,817						
22	,185	,579	97,397						
23	,165	,515	97,912						
24	,130	,406	98,317						
25	,111	,347	98,664						
26	,100	,313	98,977						
27	,096	,300	99,277						
28	,077	,241	99,518						
29	,053	,167	99,684						
30	,044	,136	99,820						
31	,041	,127	99,947						
32	,017	,053	100,000						

Extraction Method: Principal Component Analysis.

Figure 15: First attempt on component retention
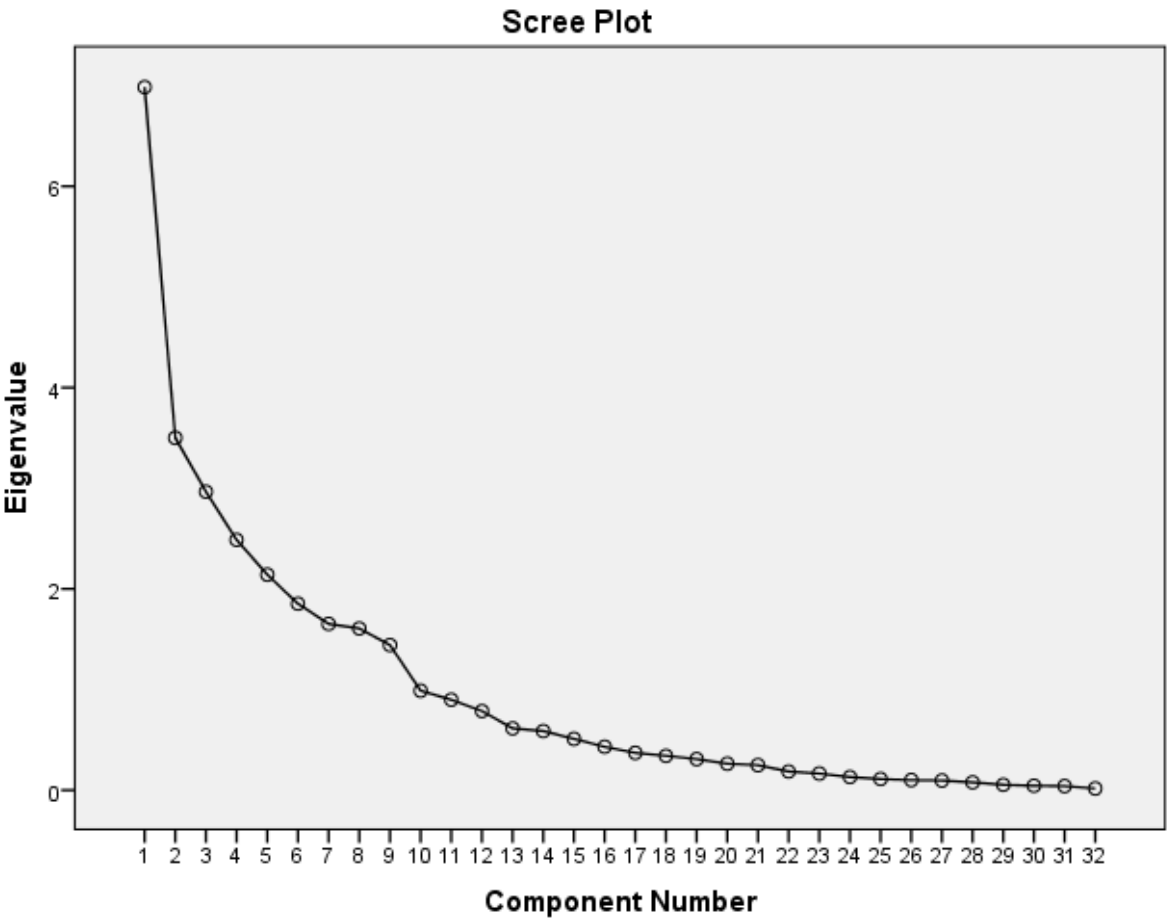
Figure 16: Scree Plot

Appendix 9: Parallel Analysis

Component or Factor	Mean Eigenvalue	Percentile Eigenvalue
1	2.736684	3.018619
2	2.456268	2.659370
3	2.246160	2.419077
4	2.069792	2.225339
5	1.923183	2.055714
6	1.787648	1.915133
7	1.666963	1.781790
8	1.551844	1.647801
9	1.443734	1.539174
10	1.345159	1.433056
11	1.252360	1.339095
12	1.163715	1.235281
13	1.083136	1.157534
14	1.006173	1.068451
15	0.932444	1.003052
16	0.861283	0.933981
17	0.795918	0.856459

Figure 17: Parallel analysis

Appendix 10: Factor Loadings of the Items

Rotated Component Matrix[a]

	Component							
	1	2	3	4	5	6	7	8
KT4	,818							
KT1	,735			-,504				
IT2	,687							
KT3	,577						-,400	
IT3	-,511					,474		
VL2		,887						
VL4		,848						
VL1		,631						
VL3		,573						
CO3			,856					
CO1			,748					
CO2			,692					
CO4			,689					
V4				,853				
V1				,699	,452			
V2				-,554				
V3				,403				
EXP2					,793			
EXP1					,778			
EXP3	-,441				,598			
EXP4					,491	,457		
PR2						,757		
PR4						,659		
PR3						,598		
PR1				,470		,517		
HT3							,844	
HT4							,714	
HT2							,638	
HT1				,420			,437	
KT2								,771
IT4								,498
IT1								,480

Extraction Method: Principal Component Analysis.
Rotation Method: Equamax with Kaiser Normalization.

a. Rotation converged in 20 iterations.

Figure 18: Factor loadings of the items

Appendix 11: Reliability of the seven underlying constructs measured sequentially

1. Iterative knowledge transfer:

Reliability Statistics

Cronbach's Alpha	N of Items
,818	5

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
KT4	17,5932	6,177	,779	,730
KT1	17,7627	5,288	,795	,720
IT2	17,9831	6,982	,500	,816
IT3	17,9661	7,585	,438	,828
KT3	17,5763	7,662	,604	,792

2. Validated learning:

Reliability Statistics

Cronbach's Alpha	N of Items
,800	4

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
VL2	11,58	3,697	,689	,711
VL3	11,73	4,546	,486	,808
VL4	11,66	4,124	,671	,725
VL1	11,36	3,957	,619	,747

3. Customer orientation:

Reliability Statistics

Cronbach's Alpha	N of Items
,778	4

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
CO1	13,51	2,909	,600	,722
CO2	13,58	3,007	,519	,756
CO3	13,73	2,236	,724	,642
CO4	13,69	2,526	,526	,763

4. Validation:

Reliability Statistics

Cronbach's Alpha	N of Items
,660	4

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
V3	12,1017	4,679	,215	,716
V1	12,1186	3,520	,565	,511
V4	12,1017	3,024	,712	,390
V2	12,1356	3,533	,339	,683

Here the Cronbach's Alpha is below the threshold of 0.7 and it is clearly visible from the table that the deletion of V3 would result in the enhancement of the composite reliability. Hence, as a part of item refinement, V3 is thus omitted for consequent analysis.

Reliability Statistics

Cronbach's Alpha	N of Items
,716	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
V1	8,0678	2,444	,626	,535
V4	8,0508	2,118	,728	,390
V2	8,0847	2,562	,325	,913

5. Experimentation:

Reliability Statistics

Cronbach's Alpha	N of Items
,806	4

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
EXP3	11,53	5,185	,629	,754
EXP1	11,03	5,206	,607	,763
EXP4	11,47	5,357	,537	,795
EXP2	11,17	4,316	,722	,704

6. Prototyping:

Reliability Statistics

Cronbach's Alpha	N of Items
,664	4

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
PR3	11,53	4,564	,370	,643
PR4	12,14	4,257	,365	,650
PR2	11,44	3,423	,585	,489
PR1	11,78	3,968	,468	,580

For prototyping, it seems like there is a slight bottleneck as none of the item deletion would resolve the problem. As the Cronbach's Alpha of 0.664 is quite close to the threshold of 0.7, none of the items are deleted and are considered for further analysis.

7. Hypothesis testing:

Reliability Statistics

Cronbach's Alpha	N of Items
,684	4

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
HT4	11,12	5,382	,583	,556
HT1	10,00	6,345	,299	,712
HT3	11,15	4,097	,547	,571
HT2	11,15	5,476	,487	,607

Hypothesis testing needs to be refined further as it is below the threshold. Item deletion of HT1 should boost this further:

Reliability Statistics

Cronbach's Alpha	N of Items
,712	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
HT4	6,64	3,578	,591	,576
HT3	6,68	2,429	,572	,603
HT2	6,68	3,670	,482	,681

Appendix 12: Detailed calculations for AVE

1. Iterative knowledge transfer

Factor loadings	Lambda	Lambda squared
KT4	.818	0.669070093471912
KT1	.735	0.540493737460637
IT2	.687	0.472481386129970
KT3	.577	0.332590254554434
IT3	-.511	0.261030347433535

Sum	2.275665819

N	5
Average variance extracted AVE	0.455133

Legend:

Lambda = Factor loadings
N = number of counts
AVE = sum of lambda squared / number of counts

2. Validated Learning

Factor loadings	Lambda	Lambda squared
VL2	.887	0.787116958305530
VL4	.848	0.719014840551945
VL1	.631	0.398635771395975
VL3	.573	0.328679545410117

Sum	2.233447116

N	4
Average variance extracted	0.558362

3. Customer orientation

Factor loadings	Lambda	Lambda squared
CO3	.856	0.731911631282065
CO1	.748	0.558837332876646
CO2	.692	0.478640521929447
CO4	.689	0.475263855346912

Sum	2.244653341

N	4
Average variance extracted	0.561163

4. Validation

Factor loadings	Lambda	Lambda squared
V4	.853	0.727363816348481
V1	.699	0.489084545609625
V2	-.554	0.306689165204855

Sum	1.523137527

N	3
Average variance extracted	0.507713

5. Experimentation

Factor loadings	Lambda	Lambda squared
EXP2	.793	0.628137159433755
EXP1	.778	0.605558975813025
EXP3	.598	0.357153353263801
EXP	.491	0.240658987603138

Sum	1.831508476

N	4
Average variance extracted	0.457877

6. Prototyping

Factor loadings	Lambda	Lambda squared
PR2	.757	0.572951755224208
PR4	.659	0.433988816029495
PR3	.598	0.357552862778535
PR1	.517	0.266892888206848

Sum	1.631386322

N	4
Average variance extracted	0.407847

7. Hypothesis testing

Factor loadings	Lambda	Lambda squared
HT3	.844	0.712147971933721
HT4	.714	0.509812492575517
HT2	.638	0.407560105161528

Sum	1.62952057

N	3
Average variance extracted	0.543174

Appendix 13: Sequential reliability checks of the construct Internationalization Success

1. Customer satisfaction:

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,625	,629	4

Item Statistics

	Mean	Std. Deviation	N
CS1	4,36	,737	59
CS2	4,19	,730	59
CS3	4,14	,706	59
CS4	4,56	,595	59

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
CS1	12,88	2,313	,346	,185	,601
CS2	13,05	2,153	,441	,249	,527
CS3	13,10	2,231	,428	,283	,538
CS4	12,68	2,498	,415	,230	,554

In the last column of the "item-total statistics" table, it can be seen that

2. Market effectiveness:

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,642	,670	4

Item Statistics

	Mean	Std. Deviation	N
ME1	4,22	,618	59
ME2	3,97	,870	59
ME3	4,27	,715	59
ME4	3,64	1,030	59

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
ME1	11,88	3,624	,521	,421	,536
ME2	12,14	3,947	,152	,107	,757
ME3	11,83	3,143	,622	,391	,450
ME4	12,46	2,459	,530	,447	,493

If one deletes item 2, the reliability is boosted to 0.757. ME2 is thus deleted from further analysis and the new reliability is as follows:

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,757	,781	3

Item Statistics

	Mean	Std. Deviation	N
ME1	4,22	,618	59
ME3	4,27	,715	59
ME4	3,64	1,030	59

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
ME1	7,92	2,355	,638	,412	,665
ME3	7,86	2,223	,569	,324	,702
ME4	8,49	1,323	,660	,447	,650

3. Current profitability:

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,936	,935	6

Item Statistics

	Mean	Std. Deviation	N
CP1	4,36	,737	59
CP2	4,39	,720	59
CP3	4,36	,783	59
CP4	4,31	,771	59
CP5	4,58	,675	59
CP6	4,59	,722	59

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
CP1	22,22	10,451	,784	,710	,927
CP2	22,19	10,258	,858	,922	,918
CP3	22,22	9,692	,908	,930	,910
CP4	22,27	9,822	,892	,834	,913
CP5	22,00	11,103	,705	,588	,936
CP6	21,98	10,845	,708	,646	,936

No items were deleted for current profitability as the score is above threshold.

Appendix 14: Sequential reliability checks of the constructs Market Uncertainty, Technology Uncertainty, Domestic Network Tie Strength & International Network Tie Strength

1. Market uncertainty:

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,383	,462	5

Item Statistics

	Mean	Std. Deviation	N
MU1	4,10	,824	59
MU2	3,78	,892	59
MU3	4,39	,558	59
MU4	3,08	,749	59
MU5	2,81	1,137	59

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
MU1	14,07	3,961	,185	,352	,337
MU2	14,39	3,070	,442	,512	,098
MU3	13,78	4,175	,334	,373	,270
MU4	15,08	3,906	,263	,085	,283
MU5	15,36	4,268	-,067	,063	,600

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,600	,589	4

Item Statistics

	Mean	Std. Deviation	N
MU1	4,10	,824	59
MU2	3,78	,892	59
MU3	4,39	,558	59
MU4	3,08	,749	59

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
MU1	11,25	2,607	,369	,338	,540
MU2	11,58	1,938	,618	,510	,299
MU3	10,97	3,344	,301	,364	,587
MU4	12,27	2,994	,274	,079	,606

2. Technology uncertainty:

The same trend could be observed for technology uncertainty. The first analysis resulted in 0.482. Item deletion of TU5 boosted the value to 0.512.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,482	,547	5

Item Statistics

	Mean	Std. Deviation	N
TU5r	4,7627	,62530	59
TU4	4,1017	,88464	59
TU3	4,4237	,69984	59
TU2	4,7458	,43917	59
TU1	4,6780	,47127	59

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
TU5r	17,9492	2,739	,121	,059	,512
TU4	18,6102	2,035	,223	,154	,484
TU3	18,2881	2,381	,236	,237	,444
TU2	17,9661	2,620	,400	,308	,374
TU1	18,0339	2,447	,483	,398	,322

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,512	,593	4

Item Statistics

	Mean	Std. Deviation	N
TU4	4,10	,885	59
TU3	4,42	,700	59
TU2	4,75	,439	59
TU1	4,68	,471	59

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
TU4	13,85	1,476	,223	,147	,581
TU3	13,53	1,771	,257	,232	,486
TU2	13,20	1,992	,446	,301	,375
TU1	13,27	1,925	,452	,365	,358

It can be further observed that another item deletion of TU4 would help to improve the score by a small margin. As the further item deletion not enabling the value to go beyond 0.7, it has been decided not to delete any more items.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,814	,817	3

Item Statistics

	Mean	Std. Deviation	N
DNTF	3,17	1,206	59
DNTD	3,05	1,305	59
DNTI	3,34	1,360	59

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
DNTF	6,39	5,449	,717	,592	,696
DNTD	6,51	4,944	,739	,611	,664
DNTI	6,22	5,554	,552	,306	,863

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,742	,778	3

Item Statistics

	Mean	Std. Deviation	N
INTF	4,00	,965	59
INTD	4,12	1,019	59
INTI	3,31	1,429	59

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
INTF	7,42	4,317	,671	,586	,573
INTD	7,31	4,181	,653	,580	,577
INTI	8,12	3,451	,460	,212	,859

Appendix 15: Skewness and Kurtosis Check

Descriptives

			Statistic	Std. Error
LS	Mean		3,9839	,05020
	95% Confidence Interval for Mean	Lower Bound	3,8834	
		Upper Bound	4,0844	
	5% Trimmed Mean		3,9945	
	Median		4,0476	
	Variance		,149	
	Std. Deviation		,38562	
	Minimum		2,93	
	Maximum		4,78	
	Range		1,85	
	Interquartile Range		,43	
	Skewness		-,482	,311
	Kurtosis		,361	,613
IntSuc	Mean		4,2613	,06893
	95% Confidence Interval for Mean	Lower Bound	4,1233	
		Upper Bound	4,3993	
	5% Trimmed Mean		4,2905	
	Median		4,2500	
	Variance		,280	
	Std. Deviation		,52947	
	Minimum		2,89	
	Maximum		5,00	
	Range		2,11	
	Interquartile Range		,58	
	Skewness		-,804	,411
	Kurtosis		,255	,613

Figure 19: Skewness & Kurtosis check

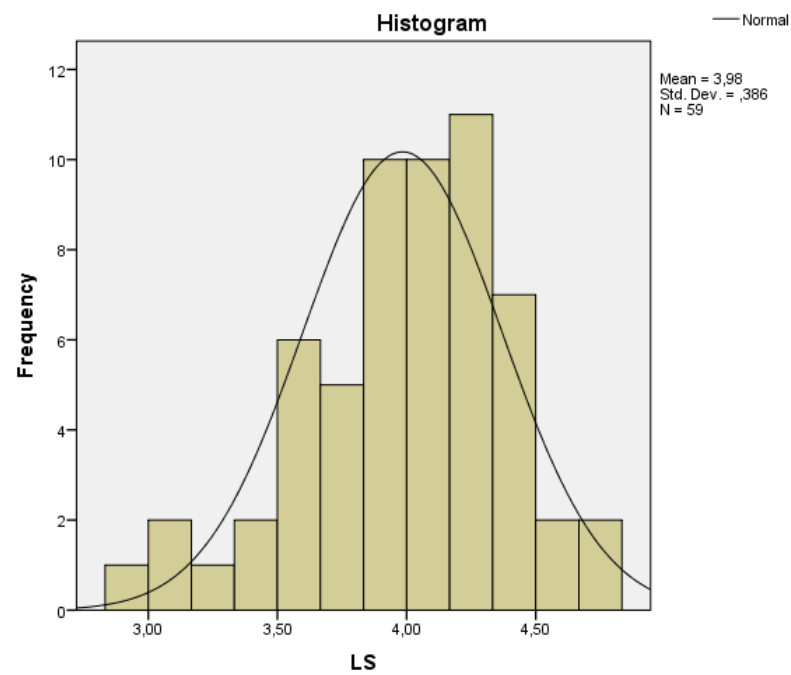# Appendix 16: Histogram and Q-Q Plots for LSM and Internationalization Success
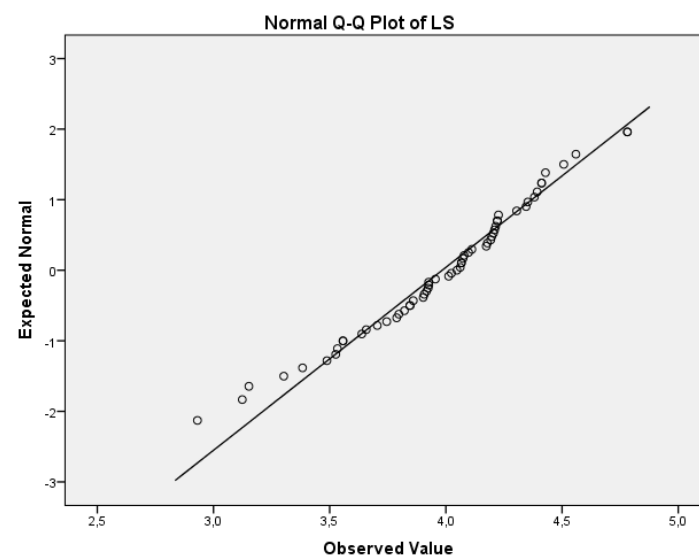
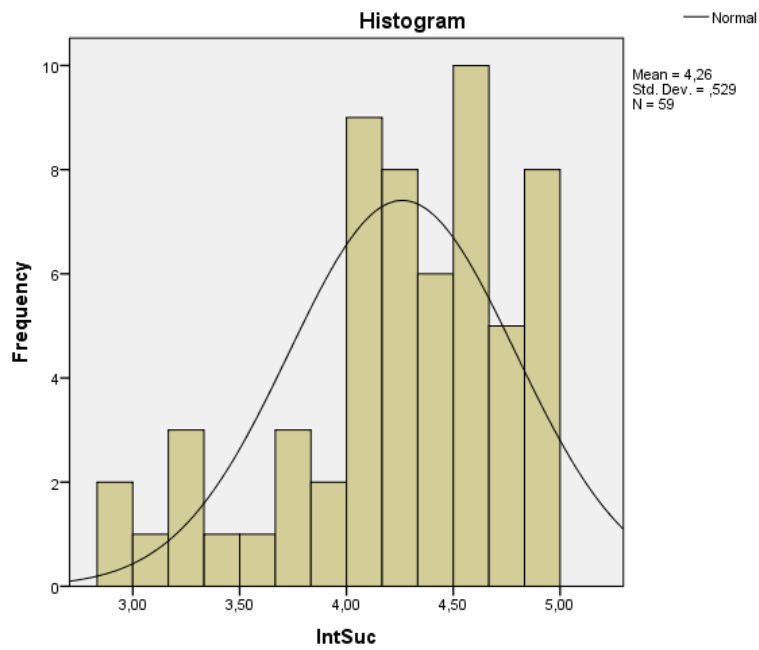

Figure 20: LSM Histogram

Figure 21: LSM QQ Plot
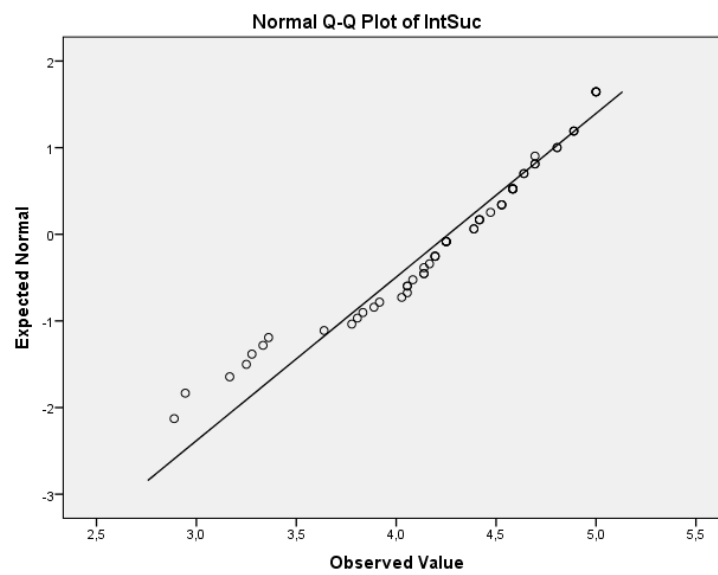
Figure 22: Histogram Internationalization Success

Figure 23: Q-Q Plot Internationalization Success

Appendix 17: Kolmogrov-Smirnov (KS) Test

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
LS	,077	59	,200[*]	,977	59	,337
IntSuc	,112	59	,065	,935	59	,004

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Figure 24: Kolmogrov-Smirnov (KS) Test

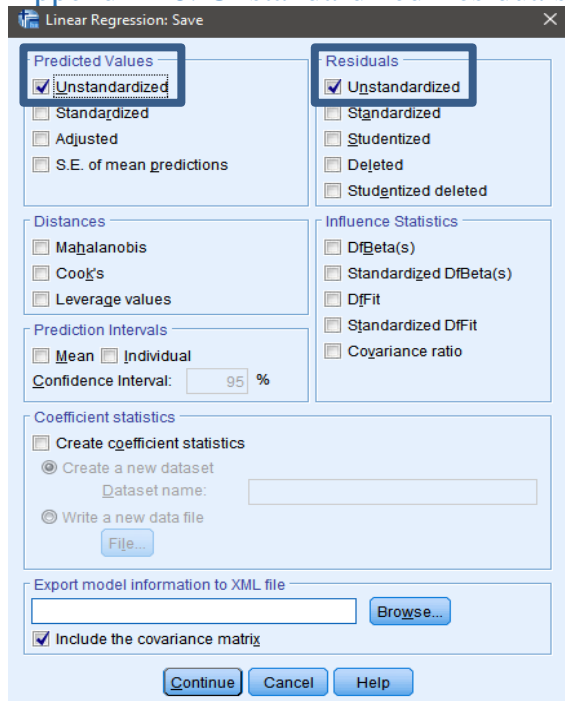## Appendix 18: Unstandardized Residuals and Unstandardized Predicted Values

Figure 25: Generation of unstnd. residuals and unstnd. predicted values in SPSS

Appendix 19: Residual Values

	PRE_2	RES_2	va
0	,22227	-,22197	
2	,28566	,13068	
9	,16673	,12685	
5	,34173	-,09655	
9	,09757	-,00547	
4	,14892	,09318	
0	,20498	-,20257	
0	,18297	-,18125	
0	,20445	-,10822	
7	,42346	-,15366	
6	,26366	,19939	
2	,20969	-,18896	
4	,09391	-,05084	
2	,17354	-,15677	
0	,19817	-,19616	
5	,01636	,03471	
9	,09757	-,00547	
4	,17197	-,13260	
4	,20445	-,16844	
2	,07662	,04067	
0	,22227	-,22197	
2	,28566	,13068	
3	,14577	-,01331	
2	,11067	-,09538	
4	,10176	,04001	
6	,17459	,28734	
1	,18559	,32924	
8	,23275	-,15046	
3	,20655	,02779	
5	,01636	,03471	
0	,11224	-,10990	
1	,17092	-,16392	
9	,10438	,08749	
3	,14315	,18342	
2	,14473	,27174	
7	,20865	-,13624	
1	,29248	-,18001	

Figure 26: Values are saved in SPSS in separate columns

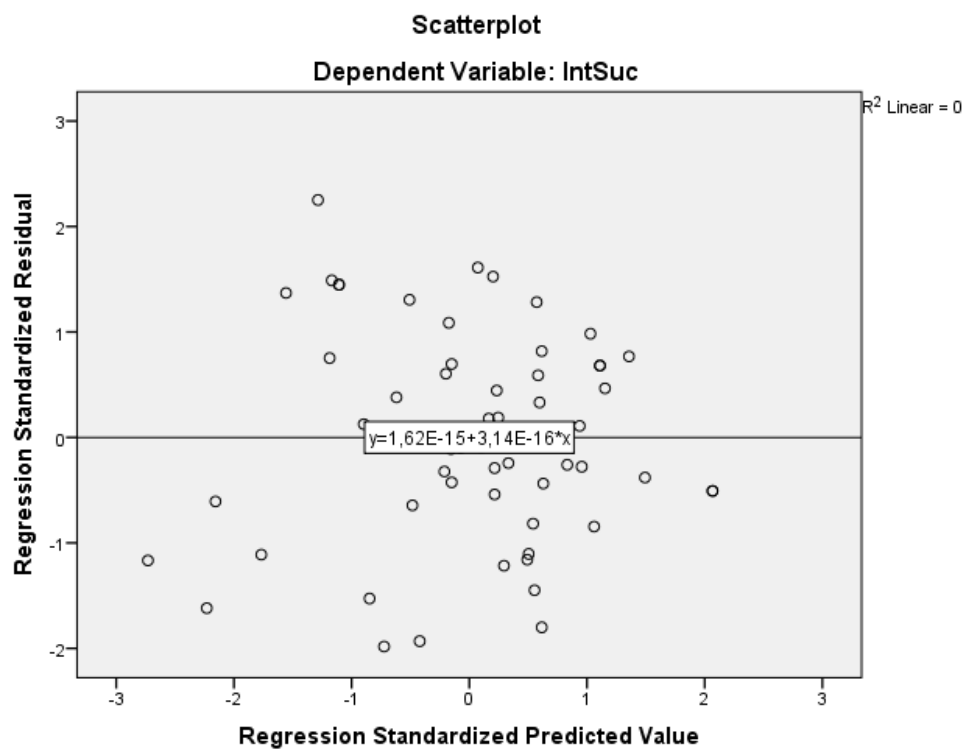# Appendix 20: Scatterplot of Predicted and Residual Values

Figure 27: Scatterplot of predicted values and residuals
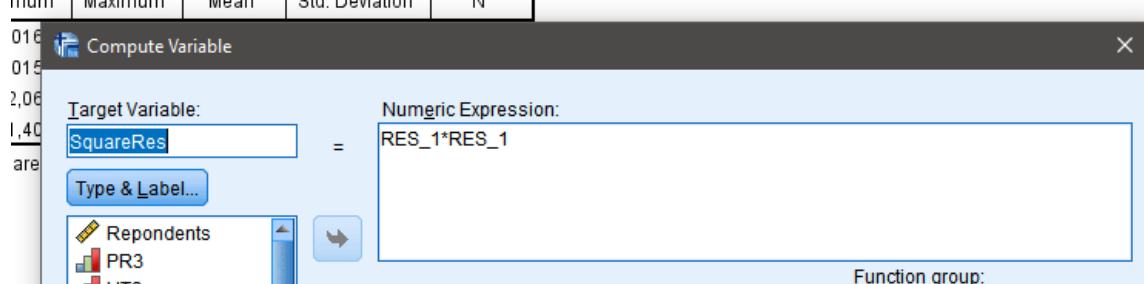
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Appendix 21: Workaround

Figure 29: Workaround "SquareRes"

Appendix 22: ANOVA Values

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	,418	1	,418	9,080	,004[b]
	Residual	2,622	57	,046		
	Total	3,039	58			

a. Dependent Variable: SquareRes

b. Predictors: (Constant), LSPz

Figure 30: P-Value Anova

Appendix 23: Durbin Watson Test

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	,552[a]	,304	,292	,44551	,304	24,922	1	57	,000	2,251

a. Predictors: (Constant), LSPz

b. Dependent Variable: IntSuc

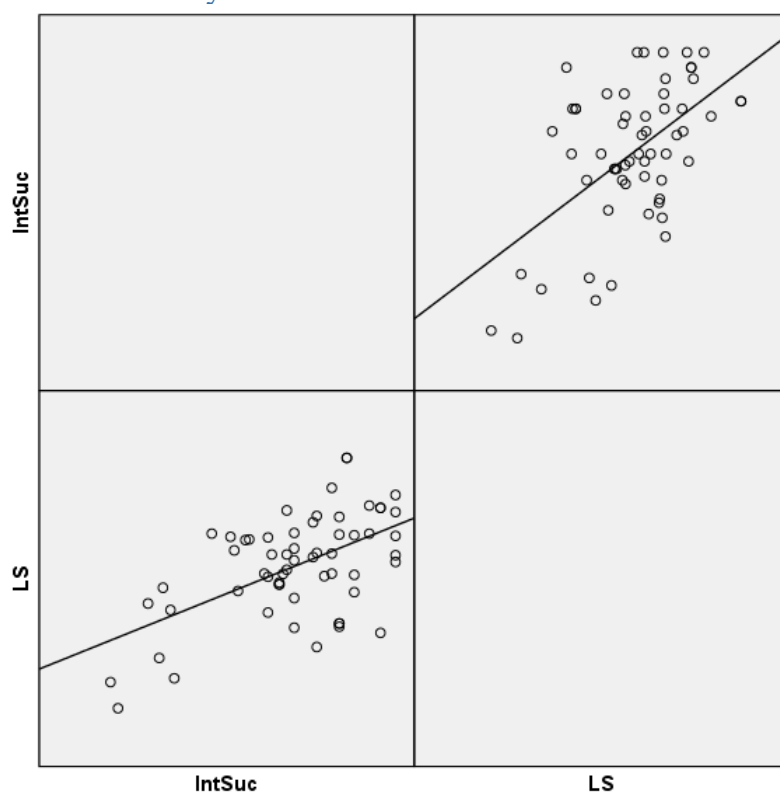*Figure 31: Durbin Watson Test*

Appendix 24: Test of Linearity

Figure 32: Test of Linearity

Appendix 25: Pearson's Correlation Matrix

Correlations

Pearson Correlation

	IKT	VL	CO	V	EXP	PR	HT
IKT	1	,165	,139	,610**	,466**	,168	,157
VL	,165	1	,143	,108	,382**	,189	,194
CO	,139	,143	1	-,049	,043	,086	-,026
V	,610**	,108	-,049	1	,415**	,248	,047
EXP	,466**	,382**	,043	,415**	1	,345**	,267*
PR	,168	,189	,086	,248	,345**	1	,177
HT	,157	,194	-,026	,047	,267*	,177	1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Figure 33: Pearson's Correlation Matrix

Appendix 26: VIF

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	IKT	,540	1,853
	VL	,824	1,214
	CO	,920	1,087
	V	,564	1,772
	EXP	,605	1,653
	PR	,841	1,189
	HT	,891	1,123

a. Dependent Variable: IntSuc

Figure 35: VIF