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**COMPARING EARLY SALES OF NEW TECHNOLOGY PRODUCTS
CLOSED BY START-UPS AND LARGE SUPPLIERS**

by

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A thesis submitted to the Faculty of Graduate Studies and Research
in partial fulfillment of the requirements for the degree of
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ABSTRACT

The objective of this thesis is to compare the early sales of new technology products for two types of suppliers: start-ups and large companies. Data from 234 early sales and 49 early buyer respondents were used to compare the early sales in terms of: early buyer's characteristics, buyer-seller's first meeting, buyer's perspective of the product offer, buyer-seller relationship, and purchase decision-making process. Results suggest that: i. early buyers purchase from start-ups for their product's high functionality/price ratio; ii. establishing trust with early buyers is important for both types of suppliers; iii. start-ups target early buyers that are smaller and geographically closer; iv. large suppliers sell directly more than start-ups do; v. suppliers target individuals in the buyer's technical functions for their first meeting; vi. suppliers rely heavily on their personal contacts to generate early sales; and vii. large suppliers involve their early buyers in product development more than start-ups do.

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1. INTRODUCTION

It all started with a great new idea, next came the business plan, then the financing and the product development. The technology is exciting, the product development team has overcome many obstacles, the latest prototype is working, and morale is high. Yet, the company introducing the new technology-based product still has to pass the most challenging of tests: selling the new product. While sellers are passionate about their products and the technologies that enabled them, generating the same enthusiasm in customers is a daunting task. Convincing a company to buy a new product early in its life cycle is difficult. Potential buyers are reticent to embrace the promise of untested new products and technologies [6, 23, 24, 30]. Even when the buyers are interested in the new product, they often want to see it operating elsewhere before they buy [23, 24, 31]. They often decide to wait and let others work through the painful initial integration [24].

For suppliers, the stakes with early sales of new products are high. For a large company, failure to successfully introduce new products may hinder its ability to grow profitably [1]. For a start-up, new product sales will determine whether or not the firm continues to operate or ceases to exist.

The introduction of comparable new products by start-ups and large suppliers is subjected to similar market conditions. Their respective operational situations, however, differ dramatically. Large companies can count on their brand, reputation, channels and installed customer base to help sell their new products. They have the potential to devote large sums of money and resources to the introduction of their new products [6, 7, 8, 13].

Their products, sales and marketing decisions have to be viewed within the context of their overall business units, distribution channels and corporate strategy [7, 8, 13, 30]. Also, new products are expected to generate large revenues quickly with margins comparable to core products [6]. New product projects compete for the firm's resources; under-performing new products may get cancelled to free up resources for more significant projects. And finally, in large companies, decision-making is typically hierarchical and involves delays [3, 7, 8, 13].

Hierarchy and red tape do not hinder a start-up's operations. A start-up's agility stems from its flat organisational structure and its ability to respond rapidly to customer demands [3, 7, 8, 13]. Funding cannot be extracted from core product revenues. Thus, lack of cash can stifle the start-up's efforts to sell its new products. Moreover, the start-up usually suffers from lack of credibility in the marketplace.

The objective of this thesis is to compare the early sales of new technology products made by two samples: technology-based start-ups and large suppliers. The two samples are compared in terms of:

- (1) buyer's characteristics (i.e., buyer's size, buyer's geographical distance from seller, and buyer's type),
- (2) first buyer-seller meeting (i.e., method used to introduce the seller to the buyer, functional department and power of the employee in the buyer's organization that initiated the first meeting with the supplier)

- (3) importance and value the buyer attached to the seller's new product offer
- (4) buyer-seller relationship (i.e., buyer's involvement in the seller's product development efforts, buyer's trust, commitment, loyalty towards the supplier and overall strength of the buyer-seller relationship),
- (5) buyer's purchase decision-making process (i.e., formality and adaptability of the procurement process, number of people involved in the purchase decision, heterogeneity of the buying centre and number of people in the buying centre known to the supplier prior to the first meeting)

The intent is to find differences in the early sales of start-ups and large suppliers based on data gathered from successful early sales. The findings will offer insights to suppliers of new, technology intensive products that can help them define and execute their sales strategies.

The remainder of this thesis has been arranged into seven sections. Section 2 provides the results of the literature review. Section 3 describes the models used in the thesis to measure the value of the product offer and the strength of the buyer-seller relationship. Section 4 develops the hypotheses used to compare the early sales completed by start-ups and large suppliers. Section 5 describes the methodology used in this research. Section 6 contains a description of the two samples, the results obtained testing the hypotheses and the data analysis. Section 7 discusses the results. Finally, Section 8 presents the conclusions, limitations and suggestions for future research.

2. LITERATURE REVIEW

The literature relevant to early sales of new products is based on lessons learned from entrepreneurship and business-to-business new product introduction. The lessons have been arranged into two streams: market penetration strategies and new product introduction success factors. In this section, I review these two streams and identify the main lessons learned from the literature.

2.1 Market penetration strategies

Moore [24] and Millier [23] identified methods to segment the target market based on the buyer's use of the new product. Once the niche target market is identified, the supplier targets innovators, visionaries, opinion leaders and/or early adopters [27, 30, 35] in organizations which use similar products [24, 35] or for which the application is the answer to a severe and recurring problem. The targeted buyer needs to appreciate the technology for what it promises and not for what it lacks when compared to alternatives. Next, the supplier dominates the niche before moving on to another niche. Essentially, the supplier builds strong references by publicly announcing [23, 34] their success in one niche market before proceeding to the next niche market.

2.2 Product Introduction Success Factors

The literature on market adoption of new technology products identifies the factors that increase the likelihood that a new product will be “adopted” by buyers.

Factors found to contribute to the adoption of new products include:

- Finding a compelling application that captures the power and value of the new product [19, 23, 28, 31]
- Being first in the market [16, 31]
- Being 10 times better than the alternative [31]
- Matching the size of the supplier to that of the new market (e.g. in a new market, a large firm should use a spin-off or form a new venture instead of developing new products within itself) [8,13]
- Smothering customers with service [31]
- Involving customer in the development of new products [10, 31]
- Quickly signing agreement with key market channels [31]
- Supporting customer deployments directly [23, 31]
- Not wasting resources on acquiring infrastructures and support systems [24, 31]
- Using media skilfully to spread a successful product image [34]
- Customizing product and/or process for target niche [23, 31]
- Using co-development with partners to drive standardization [24]

2.3 Lessons Learned

The early sales literature is growing and has provided many lessons. However, the early sales literature:

- Does not differentiate the success factors that apply to start-ups from those that apply to large suppliers
- Does not incorporate lessons from the literature on buying centres, management heterogeneity, and process formality and adaptability
- Has not developed an empirical framework for measuring the buyer-seller relationship developed during the early sale

2.3.1 Supplier size

The early sales literature does not specify whether or not the answers to the questions below are contingent on the size of the supplier:

- Should the supplier target a large buyer who can be a highly visible reference or should it target a smaller buyer that is easier to support directly?
- Should a supplier expect its early sales of new products to come from customers in the largest growing market for its product or from customers located close to home?
- Should a supplier expect its early sales of new products to come from integrators/distributors/OEM or from direct sales?

- What method of introduction should a supplier use to secure the first meeting with a potential customer?
- Should suppliers of new products first target the highly technical people or executives in the buying organization?
- Do buyers that purchase new products early in their life cycle, select suppliers based on their new products' cost/functionality ratio or the supplier's credibility in the market place?
- Is the supplier selection decision affected by the importance the buyer attaches to the solution offered by the new product?

2.3.2 Buying centres and their operating environment

Roles in a buying centre

In a large company, purchase decisions are made by a group of people referred to as the buying centre [30]. The literature that examines buying centres identifies the different roles involved in organizational purchases. One key role for the early sales is the initiator [30]. The initiator is the person who first introduces the product and/or the supplier to the other members of the buying centre.

Buying centre heterogeneity

Top management heterogeneity has been linked to propensity for action and was positively associated with enhanced creativity and innovativeness [19]. The heterogeneity concept has not been dealt with in the early sales literature. It is not known whether or not buying centre heterogeneity affects the selection of a supplier in the same ways that top management heterogeneity affects company performance.

Purchasing process formality and adaptability

Product development process formality and adaptability have both been found to favourably affect operational and market outcomes even under uncertain market conditions. [34]. The formality of policies and procedures aid effectiveness by introducing controls and reviews to provide a sense of structure, simplify the identification of requirements and reduce ambiguity [34]. Process adaptability facilitates creativity in problem solving and provides local control of the task [34].

Using what is known about buying centre's roles, management heterogeneity, and process formality and adaptability to what is known about early sales may answer the following questions:

- Are start-ups more successful than large suppliers when the early buying centre is configured in certain ways?

- Are the buying centres from start-ups more or less heterogeneous across functional departments than the buying centres from large suppliers?
- Can start-ups sell their products to buying centres that work within formal procurement processes?

2.3.3 Buyer-seller relationship framework

Increasingly, suppliers and buyers recognise the importance of building strong relationships based on trust and commitment [28]. Relationships buffer the shock of change [24] and are difficult for competitors to replicate. Effective relationships may provide competitive advantage to both suppliers and customers [2, 3]. The relationship literature revolves around exchange theory and its offspring: marital theory, bargaining theory and power theory [9]. Relationships evolve through phases identified as awareness, exploration, expansion, commitment and dissolution [9]. However, the literature thus far has not provided the means to measure a buyer-seller relationship [9].

3. MODELS

This section examines two models that are needed for this research. The first model identifies categories of value for the new product offer from the buyer's perspective. The second model, also based on what has been published in the literature, was developed by the researcher to measure the strength of a buyer-seller relationship

3.1 Value of the product offer

Value is usually defined as the benefits derived from using the product minus the costs of acquiring, maintaining, and using it [28, 30]. However, in this research, we are interested in the value an early buyer - a company that purchases a technology intensive product early in its life cycle - attributes to a new product offer. We are concerned with categorizing the value perceived by the buyer and attributing a relative score to each category. To assess value of the new product purchased from start-ups and large suppliers, we use Barnes' model [3].

Barnes defines value as having five distinct categories: product-based, process-based, performance-based, people-based and emotion-based. The first three categories correspond to Olivia's definition of "value-in-use" [28], i.e. the value perceived while using the product while the last two value categories are consistent with Olivia's "supplier/brand" value definition [28]. The first two columns in Table 1 show Barnes' value model mapped to Olivia's definition. The third column identifies examples of each of Barnes' five categories that were found in my literature review.

Table 1: Value Model Used in this Research

CATEGORY		EXAMPLES
Value-in-use	Product	Low price [3] Features [3] Financial measures: IRR, ROI, Break Even [16, 17]
	Process	Convenience of channel [3] Sale terms and conditions [3] Customisation [5, 24] Third party product availability [24] Product has become de facto standard [24] Best fits existing system
	Performance	Fastest, smallest, lightest [6] Quality, Reliability [3] Ease of use [3] Fast problem resolution [31] Immediate availability [24] Whole end-to-end solution provided [24]
Supplier/Brand Value	People	Service excellence [3] Trust employees to deliver [25] Employee's ability to solve our problem, help difficult deployment/procurement [3] Employees pay attention to customer needs [24] Depend on firm for particular skills, knowledge Relationship with some employees [3]
	Emotional	Availability of references [24] Reputation, best brand [3, 28] Technology leader [24], Market leader [24] Joint investment [3] Relationship with company [3] Share risks and rewards [3]

Barnes arranges the five categories in Table 1 from low value (product-based) to high value (emotional-based). The rationale is that the more difficult for a competitor to replicate the value, the higher the value delivered to the buyer. For example, the cost or functionality of a product can be easier to replicate. Thus, the product-based category is considered to have the lowest value. The supplier's reputation or brand cannot be easily replicated. Thus, the supplier/brand value is considered to have the highest value. Barnes' value model provides the framework for measuring value a buyer perceives in a new product offer.

3.2 Buyer-Seller Relationship Model

Figure 1 shows the five attributes of the model the researcher developed to measure the strength of a buyer-seller relationship. The model conceptualizes the buyer-seller relationship as comprised of five attributes: value, trust, commitment, collaboration and loyalty.

Figure 1: Buyer-Seller Relationship Model

Value is the first building block of the buyer-seller relationship. Value is the reason for the existence of the buyer-seller relationship. Indeed, a buyer-seller relationship operates very much like a trade agreement; if the difference between the overall benefits and costs of the total association is in excess of some minimum, the parties will engage in a relationship [9].

Trust is the second building block of the buyer-seller relationship. Trust is important to relational exchanges because "relationships characterized by trust are so highly valued that parties will desire to commit themselves to such relationships" [9, 26]. Trust "decreases a party's decision-making uncertainty because the trusting party has confidence that the trustworthy party can be relied on" [9, 26]. In a high-risk situation like buying a new product at an early stage of its lifecycle, a buyer will commit only to a trusted supplier.

Commitment is the third building block of the buyer-seller relationship. Commitment follows after the establishment of trust between parties. Commitment requires the buyer and the seller to work at and maintain a relationship [9, 26]. Uncommitted parties can easily cancel their involvement with each other.

Collaboration is the fourth building block of the buyer-seller relationship. When both commitment and trust are present, they produce outcomes that promote efficiency, productivity and effectiveness. Commitment and trust lead to collaborative behaviours [9, 26] that reduce the uncertainty involved in integrating new products into buyers' operations.

Finally, loyalty is the fifth building block of the buyer-seller relationship. While commitment reflects the current state of the relationship, loyalty reflects its future. Spending valuable resources creating or maintaining a relationship with a buyer without the benefit of its loyalty may lead the supplier to negatively re-evaluate the value of the

relationship. If the cost of maintaining the relationship surpasses the benefits, the supplier or the buyer may dissolve the relationship. Loyalty thus serves as an important measure for assessing the strength of the relationship [9, 32].

For each of the five attributes of the buyer-seller relationship, Table 2 shows the references for the definitions used in this research.

Table 2: Definitions of the Attributes in the Buyer-Seller Relationship Model

<i>Attributes</i>	<i>Aspects</i>
Value	<p>Product-Based [3]</p> <p>Process-Based [3]</p> <p>Performance-Based [3]</p> <p>People-Based [3]</p> <p>Emotionally-Based [3]</p>
Trust	<p>Expertise [14, 25, 26], belief, confidence or expectation that vendor has required skills</p> <p>Reliability [14, 25, 26], belief, confidence or expectation that the vendor can perform those skills reliably</p> <p>Intentionality [14, 25, 26], belief, confidence or expectation that another company has intentions and motives that will result in a positive outcome for the firm and that it will not take unexpected actions that would result in a negative outcome [26].</p>
Commitment	<p>Lack of alternatives [3], commitment based on lack of better choice</p> <p>Temporal aspect [15, 18], i.e. longevity of relationship</p> <p>Instrumental aspect [15, 18], some form of investment in the relationship (financial, time, effort)</p> <p>Attitudinal aspect [15, 18], desire to pursue relationship</p>
Collaboration	<p>Linkages [5], degree to which the systems, the procedures and routines of the buying and selling organisations have been linked to facilitate operations</p> <p>Information Exchange [5, 9, 26], willingness of both parties to share important, even proprietary, information.</p> <p>Conflict attitude [5, 9, 26], degree of functional conflict, i.e. degree to which conflict prevents stagnation, stimulate interests and curiosity and provide a medium through which problems can be aired and solutions arrived at</p> <p>Access [23, 29], degree to which the firms have access to all levels from design engineers to executives in each other's firm.</p> <p>Multi-Department Involvement [5, 10], degree to which the buyer and supplier firms' various departments communicate with each other.</p>
Loyalty	<p>Share of wallet, willingness to expand business trade with a particular supplier [3, 32],</p> <p>Willingness to pay full price for the supplier's product (not just discounts) [3],</p> <p>Word of mouth (or in this context, to publicly announce its use of the seller's product) [3, 32],</p> <p>Repeat business (this context, future intentions) [3, 32].</p>

4. HYPOTHESES

4.1 Buyer's Characteristics

In a large supplier, new products are expected to generate large revenues quickly with margins comparable to core products [6]. For this reason, a large supplier's sales teams may target those substantial opportunities offered only by large buyers. Based on their scarce personnel and monetary resources, start-ups cannot exploit the large scale of the opportunities offered by large buyers. To provide the high level of support required for the early sales, the start-ups' sales team may target smaller opportunities offered by smaller buyers. Therefore:

Hypothesis 1: The early buyers that purchase from large suppliers are larger in size than the early buyers that purchase from start-ups.

Large suppliers typically have a few campuses devoted to developing products and many international offices that serve the local markets. Thus, the new products may be sold to buyers in many far away locations. A start-up typically does not have an extensive international infrastructure to sell its new product. Start-ups may be constrained to selling to buyers that are closer in distance to the sites where they develop their new products. Therefore:

Hypothesis 2: The geographical distance between the start-ups and their early buyers is shorter than the distance between large suppliers and their early buyers.

Moore suggests that direct sales are the best mode for selling new technology products [24]. Large suppliers have the resources to sell directly. For start-ups, direct sales may not be a cost-effective sales mode. With few sales and support team members, not to mention fewer contacts into potential buyers, start-ups may need the help of indirect sales channels like Value-Added-Resellers (VARs), integrators, distributors and Other Equipment Manufacturers (OEM) [24] to market and provide support for their new product. Therefore:

Hypothesis 3: Large suppliers use direct sales more than start-ups do.

4.2 First Buyer-Seller Meeting

During the early stages of a new product, suppliers seek an initiator, i.e., a person inside the targeted buyer organization that can set up the first meeting. We reason that in order to champion the new technology-intensive product in the buying centre, the initiator must be aware of technological development in the market. We conclude that the initiator comes from the buyer's technical function. Therefore:

Hypothesis 4: The initiator is more likely to come from a technical function than any other function.

How does the supplier meet the initiator? Buyers and sellers could meet at trade shows, the suppliers could cold call targeted buyers or buyers could contact the supplier based on an advertisement or a web site search. However, I surmise that large suppliers mostly use their existing network of relationships to meet initiators. While employees of start-ups may not benefit from the same large relationship networks that large suppliers do, they do have a number of personal contacts made during their previous industry experience. Additionally, start-ups typically select board members for their industry contacts. Therefore:

Hypothesis 5: Personal contact is the most frequently used method to introduce the seller to the early buyer's buying centre.

There is no mention of the initiator's power level in the literature. Is the initiator an executive or someone in a lower departmental position? Large sellers, by virtue of their reputation and importance in the market place, can access the executives in most buyer firms. Start-ups lack the presence and contacts to reach the buyer's executives. Even when their board members have contacts in the targeted industry, they may not be able to reach the very top levels of the targeted buyers. I surmise that start-up may enter the buyer's company at a lower managerial level than large companies do. Therefore:

Hypothesis 6: The initiators who introduce large suppliers to the early buyers' buying centres have more power than the initiators that introduce start-ups.

4.3 Importance and Value

Deploying a new product involves exposing the buyer to risk. This risk increases if the solution is delivered by a start-up. It seems logical then that buyers would buy from a start-up only if the solution they offer is not critical to their own success. When the supplier is solving a problem that is of strategic importance to the buyer, the buyer may become dependent on the supplier [4, 5]. This is exacerbated when the product is new to the market because the new product solution is typically proprietary [6, 24]. We reason that buyers may not wish to become dependent on start-ups if the solutions they wish to purchase are very important to them. Therefore:

Hypothesis 7: Early buyers attach less importance to the product/solution they purchase from start-ups than the importance attached to the product/solution purchased from large suppliers.

A common belief is that, to be successful, the value of a new product offer must be at least ten times better than the value of commonplace solutions [6, 31]. Start-ups could not be 10 times better in terms of supplier credibility or brand (emotional value) as their firms are new to the market. So start-ups could only be 10 times better at value-in use (i.e. product, process and performance values). Large suppliers, on the other hand, could derive their value from any of the categories identified in Barnes' model. Large

suppliers have a clear advantage over start-ups due to their supplier/brand value. Given that value in use is rated lower than supplier/brand value on Barnes' model [3], I posit:

Hypothesis 8: Early buyers find less value in start-ups' product offers than in large suppliers' product offers.

4.4 Buyer-Seller Relationship

Customer involvement in product development increases the likelihood of product success [1, 10, 31]. Large suppliers have a list of buyers readily available for involvement in their new product design efforts. Start-ups, however, do not have current customers to help them through their product development efforts. In fact, potential buyers may not want to waste their resources helping a start-up until it has a stable product [31].

Therefore:

Hypothesis 9: Large suppliers involve buyers in their new product development cycle more than start-ups.

One definition of trust is a party's willingness to depend on the other party [25]. Buyers may be more willing to depend on a supplier that has already demonstrated its credibility and staying power, i.e. a large supplier. Buyers may want to depend less on a start-up that has not yet demonstrated its capability to deliver a new product. Therefore:

Hypothesis 10: Early buyers trust large suppliers more than they trust start-ups.

Commitment increases when partners start excluding other exchange partners that could offer similar benefits [9]. This shift occurs over time once the parties have consistently demonstrated their value [9]. It seems reasonable to assume that many early buyers will be found within the large suppliers' existing pool of customers [6]. This demonstration of repeat purchases already reflects the exclusion of other potential partners thus showing a commitment towards the large supplier. On the other hand, the relationship between the start-up and the early buyer is new. It would be too early for the buyer to start excluding all other possible vendors, especially given the uncertainty associated with start-ups. Therefore:

Hypothesis 11: Early buyers' commitment to large suppliers is greater than their commitment to start-ups.

A start-up may have closed the sale based on the fact that few or no other supplier alternatives were available. Once other players enter the market, the buyer may switch to another supplier. The buyer may select a supplier that has previously supplied products to the firm, that has the resources to provide a solution fully integrated with the rest of the installed infrastructure or that has more market place credibility. If the original sale was closed with a large supplier, the buyer will be less inclined to switch to another vendor as

the supplier already has market clout and the resources to make the solution comprehensive. So, I propose:

Hypothesis 12: Early buyers are more loyal to their large suppliers than to start-ups.

We have argued that value, trust, commitment and loyalty are expected to be greater towards large suppliers. Since those attributes constitute four of the five relationship building blocks defined in our buyer-seller relationship model, the overall relationship strength should also be greater for large suppliers. Therefore:

Hypothesis 13: The strength of the buyer-seller relationship is greater for large suppliers than it is for start-ups.

4.5 Purchase Decision-Making Process

The purchase decision-making process hypotheses are related to the fact that we expect start-ups to sell to smaller buyer firms whereas large suppliers will seek larger buyer firms as argued in hypothesis 1.

In large firms, decision-making is hierarchical and involves delay due to the amount of red tape [3, 7,8,13]. Thus, we expect a large buyer's procurement process to be governed by rules and procedures. The small firm, on the other hand, derives its agility

from its flat organizational structure [3]. So, in a small buyer firm, the decision to purchase a new product will be made by employees that do not need to consult many hierarchical levels above them. They may benefit from more discretion in the selection of the supplier. Therefore, I propose the following two hypotheses:

Hypothesis 14: The degree of procurement process formality encountered during the early sales cycle is lower for start-ups than large suppliers.

Hypothesis 15: The degree of procurement process adaptability encountered during the early sales cycle is higher for start-ups than large suppliers.

A heterogeneous group is comprised of individuals from different backgrounds and characteristics [19]. In business-to-business transactions, a group of individuals (i.e., buying centre) makes the purchasing decision. Each member of the buying centre plays a role (e.g. decider, influencer, economic purchaser, end-user)[30]. In a large buyer firm, more than one person or department occupy each role in the buying centre [30]. A large buying committee where many functions are represented (i.e. more heterogeneous) makes the purchase decision [30]. In a smaller buyer firm, one person may occupy the roles of the decider, influencer and purchaser [30]. Thus, fewer functional departments will be represented on the buying committee (i.e. less heterogeneous). Therefore:

Hypothesis 16: The number of people in the buyer's buying centre is larger for large suppliers than for start-ups.

Hypothesis 17: The heterogeneity of the buyer's buying centre is higher for large suppliers than for start-ups.

When decision-makers face an uncertain purchase decision for which they will be held accountable, having a prior relationship with the supplier's management may reduce their apprehension. Indeed, the trust and satisfaction established in prior collaboration lead to increased risk taking by both parties [9]. The product or technology the buyers purchase may be unknown, but previous history may have proven that the supplier team can be relied upon.

Since I expect large suppliers to sell their new products mainly to their existing customers [6], they may have established relationships with members of the buying centre prior to introducing the new product. I propose:

Hypothesis 18: The number of decision-makers known to the supplier prior to the first meeting is higher for large suppliers than for start-ups.

5. METHOD

5.1 Sample Selection

Two samples were used to test the hypotheses. The testing of hypotheses 1, 2 and 3 did not require respondents to complete the questionnaire prepared for this research. The information required for testing these hypotheses could be found on the web. Testing of hypotheses 4 to 18 required respondents to complete and submit the questionnaire. For this reason, the sample used to test hypotheses 1 to 3 was a larger sample. The following process was used to select the two samples used in this research:

1. Industrial product markets were selected using the criteria shown in section 5.1.1
2. Suppliers that had introduced new, technology-intensive products in the product markets selected in step 1 were identified using trade magazine articles
3. Start-ups and large suppliers were selected from the suppliers identified in step 2 using the criteria shown in section 5.1.2
4. Early buyers were identified using the press releases issued by the start-ups and large suppliers identified in step 3 and selected using the criteria shown in section 5.1.3
5. Hypotheses 1, 2 and 3 were tested using the data published on the Web by the early buyers identified in step 4
6. The names of the buyer employees that appeared in the press releases of the early buyers selected in step 4 were compiled into a database
7. A questionnaire was sent to each of the individuals identified in step 6 that could successfully be reached by e-mail

8. An e-mail with the questionnaire was sent three times to those reachable individuals.
Then all those who had not replied were contacted by phone and asked to return the completed questionnaire
9. Completed questionnaires were received via e-mail and then checked to ensure that they had been completed properly
10. The sample used to test hypotheses 4 to 18 was comprised of the questionnaires that were completed properly

5.1.1 Product Market Selection

The criteria used to select product-markets were:

- The product market had to be one that pertained to telecommunications, the Internet or computer networking.
- The product was bought by businesses, not consumers
- The product embodied a new software or hardware platform, not one which was simply an incremental change on an existing platform
- The early sales in those product markets occurred after January 1, 1999

The following product-markets were selected using the criteria identified above:

- Voice over Internet protocol (VoIP)
- Wireless Local Area Network (WLAN)
- Grid Computing

- Business Intelligence
- Biometrics

5.1.2 Supplier selection

Start-ups and large suppliers were identified using the following criteria:

- A start-up was founded no more than 4 years prior to the first sale announced in the company's press releases
- A large supplier exceeded \$ 100M US in revenues the year the first sale of the new product was made

Using the criteria above, 23 start-ups and 12 large suppliers were selected.

5.1.3 Early buyer selection

The criteria used to select early buyers that had purchased new products from the 23 start-ups and 12 large suppliers were:

- the earliest buyers by press release date
- up to a maximum of 10 early buyers identified for each supplier
- buyer could be a direct buyer, an integrator, a distributor, a Value-Added-Reseller (VAR) or an Original Equipment Manufacturer (OEM)

Using the criteria above, 234 early buyers were identified: 123 bought new products from the 23 start-ups and 111 bought new products from the 12 large suppliers. The 234 early buyers identified in this manner are referred to as the Full sample.

5.1.4 Respondent Selection

A total of 49 questionnaires were returned, 30 completed by employees of early buyers of products sold by start-ups and 19 completed by employees of early buyers of products sold by large suppliers. All returned questionnaires were accepted. The sample referred as Respondent sample is comprised of the responses in the 49 questionnaires.

5.2 Measures

Buyer's Size was categorised as small, medium, large or giant. Table 3 shows how the categories were defined:

Table 3: Buyer Size Definition

small	medium	large	giant
revenue < \$ 8M	\$8M < revenue < \$100 M	\$100 M < revenue < \$1 B	revenue > \$1 B

Note: all values are in US dollars/year.

Buyer's type showed whether the buyer was a direct buyer, a distributor, an integrator, Original Equipment Manufacturer (OEM) or a Value-Added-Reseller (VAR). A direct buyer was the end-user of the product. A distributor resold the new products only. An integrator was a firm that integrated large scale solutions for local or international

customers. An OEM was a buyer that incorporated the seller's product into its own solution and then marketed it, sold it and supported it as its own product. A VAR was a regional distributor that also offered additional services to buyers. Direct sales (where buyer is the end-user) were coded type = 1 and all other sales closed with VAR, integrator, etc were indirect sales and coded as type = 2.

Distance between buyer and seller was coded as follows: 1 = same district (within 200 kilometres), 2 = same province/state, 3 = same country, 4 = same continent, 5 = different continents. The seller's location was the corporate headquarters and the buyer's location was that of the respondent's local office.

Power of initiator was coded using a method adapted from Eisenhardt and Tabrizi's [10] where Executive = 2, Executive's direct report = 1 and Any other levels below that = 0.

Initiator's department was reported using 4 categories: CEO/COO, Technical (including IT and Engineering), Vertical and Business Unit/Marketing. Vertical referred to a department found only in one particular industry, e.g. Reservation Department for an airline.

Method of introduction reported using 6 categories: Advertisement/Web, Indirect Contacts, Investment, Personal Contacts, Phone Call (from supplier or to supplier) and Trade Shows.

The importance of the product was rated on a 7 point Likert scale with anchors ranging from Lowest priority = 1 and Highest priority = 7 [5].

Value was rated using Barnes's [3] categorisation where product-value = 1, process-value = 2, performance-value = 3, people-value = 4 and emotional-value = 5.

Involvement in product development was measured using Eisenhardt and Tabrizi's method [10]. Product development was divided into four stages: planning (from start to basic product requirements), conceptual design (from basic product requirements to final product specifications), product development and testing. A score of 1 was attributed for each stage for which the buyer reported participating in the supplier's meetings and activities. The involvement in product development's total score was the sum of the scores at each stage for a maximum score of 4.

Buyer and seller relationship index was a number between 0 and 1 that represented the strength of the buyer-seller relationship as viewed from the buyer's perspective. The relationship index was the average of scores on five attributes. Likert scales were used to obtain scores for trust (3 questions), collaboration (5 questions) and loyalty (3 questions). A statement selection was used to obtain scores for value and commitment (as seen in questions 6 and 14 of the questionnaire in the appendix) . The statement selection method used a series of phrases describing increasingly relational actions between the buyer and the supplier for an aspect of the relationship. The buyer selected the statement that most

appropriately defined their relationship with the supplier. For example, there are four statements for commitment:

1. No commitment. There were no other alternatives (*i.e. No commitment*)
2. We have known/used this supplier for a long time. (*i.e. longevity commitment*)
3. Our company had committed a significant investment already (e.g., time, effort, money) and switching to another supplier would have been wasteful. (*i.e. investment commitment*)
4. Our company has an established strategic relationship with this supplier and we work at maintaining it. (*i.e. attitudinal commitment*)

Selecting the third statement would result in a score of "3" out of "4" or 0.75.

The questions measured with Likert scales and the statement selections were adapted from existing literature [3,4,5,14,15,18,25,26,32]. The following is an example of the relationship index calculation:

<u>Value:</u>	0.20 (1 out of 5)
<u>Trust:</u>	0.34 (average of expertise, reliability and intention)
expertise	0.43 (3 out of 7)
reliability	0.29 (2 out of 7)
intentionality	0.29 (2 out of 7)
<u>Commitment:</u>	0.75 (3 out of 4)
<u>Collaboration:</u>	0.37 (average of linkages, information sharing, etc)
linkages	0.14 (1 out of 7)
information sharing	0.57 (4 out of 7)
conflict attitude	0.43 (3 out of 7)
access	0.14 (1 out of 7)
multi-department	0.29 (2 out of 7)
<u>Loyalty:</u>	0.43 (average of share of wallet, etc...)
share of wallet	0.43 (3 out of 7)
pay full price	0.29 (2 out of 7)
future intentions	0.57 (4 out of 7)

Total:	2.03 out of 5
Index:	0.41

Formality of the procurement process was the extent to which rules, policies and procedures were followed for the procurement process. This statement was rated on a 7-point Likert with anchors ranging from (1) Not at all and (7) To a great extent [34].

Adaptability of the procurement process was the degree of discretion available to determine the product to buy and the supplier to provide it. It was rated on a 7-point Likert scale with anchors ranging from (1) No discretion to (7) Complete discretion [19].

Buying centre heterogeneity was measured for each buyer by a variation of the Herfindal-Hirschman index [19]:

$$H = 1 - \sum_{i=1}^8 p_i^2$$

where H is the heterogeneity measure and p the percentage of decision-makers in each of the following functional background categories: CEE/COO, Marketing/Sales/Customer Service, Finance/Accounting/Controller, R&D, Manufacturing/Operations, Purchasing, Information Systems and Others.

Number of people in the buying centre known to supplier prior to first meeting was derived by dividing the number of people in the buying centre known to supplier by the total number of people in the buying centre. This variable was thus the percentage of people on the buying committee that the supplier previously knew prior to the first meeting.

5.3 Data Analysis

5.3.1 Testing Hypotheses

Hypotheses 1 to 3 and 6 to 18 were tested using the two independent samples t test for comparing means. The procedure tests the null hypothesis that the population mean of a variable is the same for two groups of cases. The level of significance for accepting the hypothesis is set at $p < 0.05$. That level of significance meant that the two groups of cases are different with respect to the tested variable. Let me use hypothesis 1 as an example of how hypotheses 2, 3, 6 to 18 will be tested.

Hypothesis 1: The buyer's size for start-ups is smaller than the buyer's size of large supplier

The variable tested is buyer size and the two groups of cases to compare are the start-ups and large suppliers. The null hypothesis (H_0) is that the buyer size of start-ups and large suppliers is the same. If the t test reports $p > 0.05$, we can not reject the null hypothesis that buyer size is the same. But we can reject hypothesis 1 since we have not concluded that start-ups and large suppliers have different buyer sizes. If the t test reports $p < 0.05$, we can conclude that the buyer size is different for start-ups and large suppliers. But we can not accept the hypothesis yet. We first need to discover which mean (the start-up's or the large supplier's) is higher.

Included in the results is the "mean difference" which is defined as the mean of group 1 minus the mean of group 2. In our example, the mean difference would be:

$$\text{Mean Difference} = \text{Mean Buyer-Size (Start-ups)} - \text{Mean Buyer Size (Large Suppliers)}.$$

A negative mean difference means that start-ups have a lower mean for buyer size (i.e. smaller buyers). So, if the t test result $p < 0.05$ and the mean difference is negative, I will accept hypothesis 1.

Hypothesis 3 was tested using the cross-tabulation Pearson chi-square statistic for comparing count and expected count. This test is similar to the two independent samples t test, except that counts are used instead of means for the comparison. Hypothesis 3 deals with buyer type and the answers (i.e. direct buyer = 0 and indirect buyer = 1) are not numerically related to each other. The cross-tabulation Pearson chi-square statistic is thus more appropriate. We test the null hypothesis that the number of expected count is the same for two groups of cases. The logic for accepting or rejecting the hypothesis is the same as for the t test with only one exception: once the null hypothesis is rejected, we use the difference between count and expected count instead of the mean difference to determine the supplier with the most direct sales. To conclude that large companies use more direct sales than start-ups, their direct sales count should be higher than the expected count and the start-up's direct sales count should be below expected count.

Hypotheses 4 and 5 were tested using the non-parametric one sample chi-square test. The one sample chi-square test tests the distribution of a categorical variable against the hypothesis that each category has a specified proportion of cases in the population. By setting the expected value equal across all categories, the one sample chi-square test tests the null hypothesis that respondents are equally likely to choose any one of the possible answers. If the significance for the test is $p > 0.05$, we can not reject the null hypothesis (i.e. the responses have a uniform distribution). If the significance for the test is $p < 0.05$, we can conclude that the answers are not equally distributed across categories. To accept the hypothesis that one category is more likely than any others, we use the residual value. If all categories have negative residual values (i.e. actual count is below expected count) except for the most likely category stated in the hypothesis which has a positive value, we can accept the hypothesis.

5.3.2 Bonferroni Adjustment

The Bonferroni correction/adjustment procedure is used when more than one test is performed in a particular study. As the number of tests increases, the chance of incorrectly declaring a difference (Type I error) also increases. Since we are testing many hypotheses and that some are regarding subjects that have not been empirically tested in the literature before, applying the Bonferroni method will allow us to solidify the validity of the results.

Using the Bonferroni method, the alpha level of each individual test is adjusted downwards to ensure that the risk of finding a difference incorrectly remains constant at

0.05. To do so, we simply divide the target significance level (say 0.05) by the number of comparisons (J) to be made (say 10 for a significance level of 0.005). However, when the number of comparisons is large, the corrected significance can be quite low. So while we have decreased the probability of making a Type I error, we have increased the probability of making a Type II error (the chance of declaring no difference when in fact there is a difference). So as not to over- or under- compensate, the variables can be divided into three groups:

1. variables that will likely show a difference
2. variables that may show a difference based on the literature supporting the hypotheses
3. variables that are tested heuristically

The variables in group 1 will not be corrected for multiple comparisons as their effects are well documented. The variables in group 2 and 3 will be corrected with the significance level of each test set at $0.05/J$, where J is the number of comparisons (hypotheses) carried out within the same group.

The effect of all variables, except for the variables pertaining to relationships and the initiator power level, has been well documented in the literature. We therefore put the variables for hypotheses 1, 2, 3, 4, 7, 8, 9, 14, 15, 16 and 17 in group 1.

The remaining variables (for hypotheses 5, 6, 10, 11, 12, 13 and 18) are classified into group 2. Group 2 variables are therefore related to buyer-seller relationships

constructs plus the initiator's power level. The hypotheses for these variables were supported by only a few empirical studies. So the Bonferroni correction will be applied with $J = 7$, i.e. the number of hypotheses tested in this group. So the new significance level after applying the Bonferroni correction must be $p < 0.05/7$ or $p < 0.007$.

Group 3 will be composed of all numerical variables (i.e. all except 3, 4 and 5) comprised in the correlation test. Since we have not pre-defined a set of hypotheses for the correlation, the Bonferroni correction must be applied. For this group, $J = 15$ and $p < 0.05 / 15 = 0.003$. So the new significance level after applying Bonferroni must be $p < 0.003$ for the correlation test.

5.3.3 Data Analysis using frequencies and cross- tabulations

With the above tests (except for the one sample chi-square test), the results will determine whether the start-ups and large suppliers have different means/counts for a particular variable and which group has the largest/lowest mean/count. Additional insights can be derived from the data by looking at the statements selected or the actual mean of a variable. For example, it may be useful to know the actual product value most often selected for start-ups and not just whether it was different from that of the large company. For that reason, to gain additional insights, the data will be examined through cross-tabulations and graphs.

6. RESULTS

6.1 Samples used in the research

6.1.1 Full sample

The full sample comprised of 234 early buyers who bought new products from the 23 start-ups and 12 large suppliers selected for this research.

The 23 start-ups were from 1 to 4 years old at the time of their first sale with an average age of 2.5 years. Eleven of the twelve large suppliers had yearly revenues of over US \$1 Billion with one at US \$713 Millions.

Table 4 shows the breakdown of the 234 early buyers in the full sample by product market and supplier size.

Table 4: Early Buyer Breakdown by Product-Market and Supplier Size

	Number of early buyers that purchased from start-ups	Number of early buyers that purchased from large suppliers	Total early buyers
VoIP	45	56	101
WLAN	23	30	53
Grid Computing	18	7	25
Business Intelligence	18	18	36
Biometrics	19	0	19
Total	123	111	234

Table 5 shows the breakdown of the 234 early buyers by geographical areas and supplier size.

Table 5: Early Buyer Breakdown by Geographical Area and Supplier Sizes

	Number of early buyers that purchased from start-ups	Number of early buyers that purchased from large suppliers	Total early buyers
Canada	9	13	22
United States	87	58	145
Mexico/Latin America	0	5	5
Europe	15	22	37
Middle East	0	2	2
Africa	0	1	1
Asia	12	10	22
Total	123	111	234

6.1.2 Respondent sample and response rate

The size of the respondent sample was defined by the number of completed questionnaires returned to the researcher. The researcher received 49 completed questionnaires from employees of early buyers; 30 from early buyers that purchase new products from start-ups and 19 from early buyers that purchase new products from large suppliers.

Table 6 shows the response rate. It was calculated as the number of completed questionnaires returned to the researcher divided by the total number of questionnaires sent to individuals reachable by e-mail.

Table 6: Respondent's Response Rate

	Number of early buyers identified	Number of questionnaires sent to reachable buyers	Completed questionnaire returned	Response Rate
Early buyers that bought from start-ups	123	104	30	29 %
Early buyers that bought from large suppliers	111	57	19	33 %

Table 7 shows the breakdown of the 49 respondents by product markets and supplier size.

Table 7: Respondent Breakdown by Product-Market and Supplier Size

	Number of early buyers that purchased from start-ups	Number of early buyers that purchased from large suppliers	Total number of early buyers
VoIP	10	11	21
WLAN	5	4	9
Grid Computing	6	1	7
Business Intelligence	3	3	6
Biometrics	6	0	6
Total	30	19	49

Table 8 shows the breakdown of the number of early buyers by geographical areas and supplier size.

Table 8: Respondent Breakdown by Geographical Area and Supplier Sizes

	Number of early buyers that purchased from start-ups	Number of early buyers that purchased from large suppliers	Total early buyers
Canada	6	5	11
United States	20	10	30
Mexico	0	0	0
Latin America	0	1	1
Europe	3	2	5
Middle East	0	1	1
Asia	1	0	1
Total	30	19	49

6.2 Hypothesis testing

Table 9 provides the two independent t test results for hypotheses H1, H2 and H6 to H18. The "Mean Difference" column reports the difference in mean value between the start-ups and the large supplier for that particular variable. The "Sig. (2-tailed)" column represents the significance of the comparison result. The results for H1 and H2 were obtained using the full sample of 234 early buyers. The remaining hypotheses were tested using 30 responses from early buyers of new products sold by start-ups and 19 early buyers of new products sold by large suppliers.

Table 9: Two Independent Samples t Test Results

		t-test for Equality of Means				
		t	Sig. (2-tailed)	Bonferroni Group	Mean Difference	Std. Error Difference
H1	Buyer Size	-4.590	0.000***	Group 1	-.6715	.14631
H2	Geographical Distance	-3.075	0.002***	Group 1	-.48	.156
H6	Initiator Power Level	-.388	0.700	Group 2	-.10	.249
H7	Importance of Product/Solution	-1.523	.134	Group 1	-.58	.382
H8	Value	-2.218	.032*	Group 1	-.1933	.08717
H9	Buyer Involvement in PD	-3.432	.001***	Group 1	-1.29	.376
H10	Trust	1.642	.108	Group 2	.0482	.02935
H11	Commitment	-.693	.492	Group 2	-.0648	.09363
H12	Loyalty	-.490	.627	Group 2	-.0316	.06452
H13	Relationship Strength	-.911	.369	Group 2	-.0359	.03940
H14	Formality	-1.555	.128	Group 1	-.90	.578
H15	Adaptability	0.012	.991	Group 1	.01	.491
H16	Number of people in buying centre	-1.458	.152	Group 1	-1.75	1.200
H17	Heterogeneity of buying centre	.145	.885	Group 1	.0110	.07581
H18	Number of people on buying centre who already knew the supplier	-2.177	.035*	Group 2	-.2758	.12671

* p < 0.05, ** p < 0.01, *** p < 0.005

The t test results indicate that:

- we can reject the null hypothesis that the mean difference is equal for hypotheses 1, 2 and 9 with $p < 0.005$. The mean difference is also negative for these three hypotheses. Together, the level of significance and the negative mean difference tells us that buyer size, buyer-seller distance and buyer involvement in product development were lower for start-ups than for large suppliers. These variables are part of group 1 for which no Bonferroni correction is made. We can thus accept hypotheses 1, 2 and 9.
- we can reject the null hypothesis that the mean difference is equal for hypotheses 8 with $p < 0.05$. The mean difference is also negative for this hypothesis. Together, the level of significance and the negative mean difference tells us that value and number of people on the buying centre who already knew the supplier were lower for start-ups than large suppliers. This variable is part of group 1 for which no Bonferroni correction is made. We can thus accept hypotheses 8.
- we could reject the null hypothesis that the mean difference is equal for hypotheses 18 with $p < 0.05$. The mean difference is also negative for these hypotheses. Together, the level of significance and the negative mean difference tells us that value and number of people on the buying centre who already knew the supplier were lower for start-ups than large suppliers. This variable is part of group 2 for which a Bonferroni correction is made. In this group, the level of

significance must be $p < 0.007$. Since we have $p = 0.035$, we cannot accept hypotheses 18 based on the Bonferroni correction.

- we cannot reject the null hypothesis that the mean difference is equal for hypothesis 6, 7 and 10 to 17. So we can reject those hypotheses since we cannot conclude that there is a difference in the means of those variables.

Table 10 and Table 11 show the cross-tabulation Pearson chi square test for hypothesis 3.

Table 10: Expected Count Results for H3

			Buyer Type		Total
			Direct	Indirect	
Seller Size	Start-up	Count	92	31	123
		Expected Count	100.9	22.1	123.0
	Large Supplier	Count	100	11	111
		Expected Count	91.1	19.9	111.0
Total		Count	192	42	234
		Expected Count	192.0	42.0	234.0

Table 11: Pearson Chi Square Results for H3

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.266	1	.002***
N of Valid Cases	234		

0 cells (.0%) have expected count less than 5

The minimum expected count is 19.92

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.005$

- we can reject the null hypothesis that the start-ups and the large suppliers have the same count for buyer type with $p < 0.005$. This variable is part of group 1 for which no Bonferroni correction is made. Since the difference between count and expected count is positive for large suppliers and negative for start-ups, we can conclude that large suppliers use more direct sales than start-ups and thus accept Hypothesis 3.

Table 12 and Table 13 show the one sample chi-square results for hypothesis 4 and 5 respectively.

Table 12: One Sample Chi-Square Results for H4

Initiator's Department			
	Observed N	Expected N	Residual
CEO/COO	7	11.3	-4.3
Technical	30	11.3	18.8
Vertical	4	11.3	-7.3
BU/Marketing	4	11.3	-7.3
Total	45		
Chi-Square(a)	42.200		
df	3		
Asymp. Sig.	.000***		

a 0 cells (.0%) have expected frequencies less than 5.
The minimum expected cell frequency is 11.3.
* p < 0.05, ** p < 0.01, *** p < 0.005

Table 13: One Sample Chi Square Results for H5

Method of Introduction			
	Observed N	Expected N	Residual
Advertisment/ Web	4	7.5	-3.5
Indirect Contacts	4	7.5	-3.5
Investment	1	7.5	-6.5
Personal Contacts	23	7.5	15.5
Phone Call	7	7.5	-.5
Trade Shows	6	7.5	-1.5
Total	45		
Chi-Square	41.267		
df	5		
Asymp. Sig.	.000***		

0 cells (.0%) have expected frequencies less than 5.
The minimum expected cell frequency is 7.5
* p < 0.05, ** p < 0.01, *** p < 0.005

- we can reject the null hypothesis that the data is uniformly distributed across functional department categories with $p < 0.0005$. This variable is part of group 1 for which no Bonferroni correction is made. So, since all residual values are negative except for the "technical" department category, we can conclude that the most likely department for the initiator is "Technical". We thus accept hypothesis 4.
- we can reject the null hypothesis that the data is uniformly distributed across method of introduction categories with $p < 0.0005$. This variable is part of group 2 for which a Bonferroni correction is made. For this group, the level of significance must be $p < 0.007$. Since our test reported $p < 0.0005$, the significance of the result still holds after correction. So, since all residual values are negative except for the "personal contacts" method of introduction category, we can conclude that the most used method of introduction is personal contacts. We thus accept hypothesis 5.

6.3 Data Analysis

6.3.1 Buyer's Characteristics

Figure 2 shows the percentage of early buyers in each buyer size category for start-ups and large suppliers. Figure 2 suggest that start-ups close more sales with small and medium size buyers than large suppliers do. Large suppliers close more sales with large and giant buyers than start-ups do.

Figure 2: Bar Graph Comparing Buyer Size

Figure 3 shows the percentage of early buyers in each buyer-seller geographical distance category for start-ups and large suppliers. Results show that 65 % of start-ups close sales with buyers within their own country. Indeed, start-ups closed more sales than large suppliers within their districts, their states/provinces and countries. By contrast, large suppliers outnumbered the start-ups for the number of sales closed outside their countries.

Figure 3: Bar Graph Comparing Buyer-Seller

Figure 4 shows the percentage of buyers in each buyer type category for start-ups and large suppliers. The majority of early sales are made using a direct sales force for both start-ups and large suppliers. But start-ups use indirect sales (VAR, integrator, distributor and OEM) in 25% of the cases compared to only 10 % for large suppliers.

Figure 4: Bar Graph Comparing Buyer Type

6.3.2 First Buyer-Seller Meeting

Figure 5 shows the departmental functions the initiators came from. "BU" means Business Unit and "Vertical" means a department only found in a particular industry. The results suggest that the people who first introduce the seller to the buying centre come mainly from a technical department for both types of suppliers.

Figure 5: Bar Graph Comparing the Initiator's Department

Figure 6 shows the buyer-seller methods of introduction. "Indirect Contact" means that a third party was involved in introducing the parties. For example, an integrator may have been the indirect contact between the seller and the buyer. Investment means that the buyer had invested capital in the venture before buying the product. Overall, personal contacts were the main method used to introduce the seller with the buyer. Start-ups, however, did not use personal contacts as exclusively as large suppliers.

Figure 6: Bar Graph Comparing the Method of Introduction

Table 14 shows the cross tabulation of early buyer size and method of introduction. It suggests that start-ups used less personal contacts as the method of introduction as the size of the buyer increased. Personal contacts were the main method used to meet small and medium buyers, but all other methods were used for meeting larger buyers.

Table 14: Cross-Tabulation of Early Buyer Size and Method of Introduction

	Method of Introduction					
	Advertisement/ Web	Indirect Contact	Investment	Personal Contacts	Phone Call	Trade Show
Small	14 %	0	0	43 %	14 %	29
Medium	11.1	11.1 %	0	33.3 %	22.2 %	22.2 %
Large	20 %	0	0	20 %	40 %	20 %
Giant	0	40 %	20 %	0	20 %	20 %

Table 15 shows the initiator's power level frequency by supplier type. This table shows that both start-ups and large companies are using executives as their first buyer contact in about half the cases. In the other half of the cases, they meet with initiators that are not executives. So, overall, the suppliers are equally likely to use executives as non-executives.

**Table 15: Cross-Tabulation of the Initiator's Power Level
and Supplier Size**

	Initiator's Power Level		
	Any Other Levels	Executive's Direct Report	Executive
Start-ups	30 %	23.3 %	46.7 %
Large Suppliers	21.1 %	31.6 %	47.4 %

6.3.3 Importance and Value

Figure 7 shows the percentage of early buyers in each importance category for start-ups and large suppliers.

Figure 7: Bar Graph Comparing the Importance of Solution

In 40 % of the cases, start-ups were selected when the importance of their solution was perceived to be of "Medium Priority" or less compared to 21% for large suppliers.. Also, "Lowest" and "Low priority" were reported only for start-ups solutions.

Figure 8 shows the percentage of buyers in each value category for start-ups and large suppliers respectively.

Figure 8: Bar Graph Comparing the Value of the Solution

The largest difference in value reported by buyers is at the product value category. Thirty-seven percent of buyers reported buying the start-up's solution for its product value (i.e. for its functionality/price) while only 5 % of buyers reported that value for large supplier products. Moreover, 69 % of buyers valued the start-up products for their "value-in-use". In contrast, 48 % of large supplier products were selected for their "supplier/brand" value.

6.3.4 Buyer-Seller Relationship

Figure 9 shows the percentage of buyers involved in none, one, two, three or all stages of product development for start-ups and large suppliers respectively.

Figure 9: Bar Graph Comparing the Buyer's Involvement in Product Development

In 70% of the cases, start-ups involve their buyer in 1 or less product development stage. Large suppliers on the other hand, involved their buyers in 2 or more product development stages in 79% of the cases. The buyers of start-up products who did not participate in product development is almost tripled that of buyers of large suppliers' products.

Also, large suppliers tended to involve their buyer all the way through the product development. Start-ups involved their buyers mainly at the testing stage. Table 16 shows the percentage of buyer involved in each phase of product development.

Table 16: Buyer Involvement in PD phases

	Start-ups	Large Suppliers
Planning	23.3 %	47.4 %
Conceptualisation	13.3 %	63.2 %
Product Development	20 %	42.1 %
Testing	53.3 %	73.7 %

Figure 10 shows the relationship index and the mean of each relationship attribute for start-ups and large suppliers respectively (all scores are out of a possible maximum value of 1). Large suppliers scored marginally higher in all relationship attributes, but trust. For both types of suppliers, trust is the attribute with the highest mean.

Figure 10: Bar Graph Comparing the Relationship

Figure 11 shows the percentage of buyers that exhibited different categories of commitment.

Figure 11: Bar Graph Comparing the Commitment Attribute

Forty-three percent of the buyers of start-up products report no commitment to their supplier. In contrast, 79 % of the buyers of large supplier products reported some kind of commitment to their large suppliers. There were 27 % of the buyers that reported an attitudinal (i.e. the highest commitment) towards their start-ups supplier. Table 17 shows the results of a cross-tabulation between buyer's commitment towards start-ups and the method of introduction to investigate this result.

Table 17: Cross-Tabulation of Commitment and Method of Introduction

	Method of Introduction					
	Advertisement/ Web	Indirect Contact	Investment	Personal Contacts	Phone Call	Trade Show
No Commitment	7.7 %	23.1 %	7.7 %	7.7 %	30.8%	23.1 %
Longevity	0	0	0	100 %	0	0
Investment	33.3%	0	0	0	33.3	33.3
Attitudinal	16.7	0	0	66.7 %	0	16.7 %

The results show that when a buyer reports an attitudinal commitment towards a start-up, the buyers and sellers were introduced using personal contacts in 67 % of the cases. Note that buyers reporting a longevity commitment towards a start-up also met through personal contact.

Although the loyalty score show comparable results, Table 18 shows that much of the data for loyalty was missing from the questionnaire answered by buyers of start-up products. Indeed, 40% of the buyers of start-up's products chose "Don't know" when questioned about their loyalty. The loyalty results for start-ups were thus calculated based on 18 buyers of start-up products instead of the usual 30.

Table 18: Data Availability for Loyalty

Supplier Size	Loyalty Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
start-up	18	60.0%	12	40.0%	30	100.0%
large	18	94.7%	1	5.3 %	19	100.0%

Collaboration was found to be positively and strongly correlated to commitment and loyalty. However, the correlation test is corrected with $\alpha = 15$, so p must be less than 0.003. With the Bonferroni correction, only collaboration is strongly correlated to loyalty. Table 19 shows the correlation coefficient and level of significance.

Table 19: Collaboration Correlation

		Collaboration Index	Loyalty Index	Commitment for Index
Collaboration Index	Pearson Correlation	1	.649	.399
	Sig. (2-tailed)	.	.000***	.007**
	Bonferroni Correction		Group 3	Group 3

- * Correlation is significant at $p < 0.05$ level (2-tailed)
- ** Correlation is significant at $p < 0.01$ level (2-tailed).
- *** Correlation is significant at $p < 0.005$ level (2-tailed)

6.3.5 Purchase Decision-Making Process

Table 20 shows the mean for all purchase decision-making variables.

Table 20: Means of Purchase Decision-Making Process Variables

Variable	Mean	
	Start-Ups	Large Suppliers
Formality	3.54	4.44
Adaptability	5.17	5.17
Number of people involved	4.72	6.47
Heterogeneity	0.52	0.51
Number of people in buying centre who already knew the supplier	0.29	0.57

Formality was derived from a Likert score where 3 corresponded to "Some extent" and 4 to "Moderate Extent". A score of 5 for adaptability corresponded to "Large

Extent" and 6 is "Considerable Extent". While 85% of buyers report having a procurement process, that process is followed only to "Some Extent" and decision-makers have "Large or Considerable" discretion in selecting the supplier.

Heterogeneity of the buying centre is almost identical for both types of suppliers. A cross-tabulation between the supplier type and the presence of the CEO/COO is reported in Table 21. This table reveals that in 80 % of the cases, the CEO or COO is involved in the decision to buy from a start-up compared to 39 % for large suppliers.

**Table 21: Cross-Tabulation of CEO/COO's Presence
on Buying Centre and Supplier Size**

		Presence of CEO or COO	
		No	Yes
Supplier Size	start-up	20.0%	80 %
	large	61.1 %	38.9 %

The start-up knew fewer of the decision-makers on the buying centre prior to the first buyer-seller meeting, although the Bonferroni correction invalidated this result. On average, start-ups already knew 1 out of 3 decision-makers (mean of 0.30) whereas the large supplier knew 3 out of 5 (mean of 0.61). But, in 59% of the cases, the start-ups did not know any decision-makers compared to 18 % of cases for large suppliers. But for the remaining 41 % of the cases, the start-up already knew 3 out of 4 decision-makers on average.

7. DISCUSSION OF RESULTS

7.1 Results from the Full Sample

The results obtained by testing hypotheses 1, 2 and 3 suggest that:

- the early buyers that purchase from start ups are smaller than the early buyers that purchase from large suppliers.
- start-ups are closer in geographical distance to their early buyers than large suppliers are to their early buyers
- large suppliers make more use of direct sales than do strat-ups

Start-ups sold to small and medium size buyers more than large companies did.

Start-ups sold to buyers within their country in 65% of the cases while large suppliers sold outside their country in 54 % of the cases. Large suppliers used direct sales almost exclusively (90 %). Start-ups, however, used a mix of direct (75 %) and indirect (25 %) sales through VARs, integrators, distributors and OEMs.

7.2 Results from the Respondent Sample

The results obtained from testing hypothesis 4 indicate that personnel from technical functions were the ones most frequently introducing both types of suppliers, start-ups and large suppliers, to their companies' buying centres.

The results obtained from testing hypothesis 5 suggest that personal relationships are the most frequent method used by suppliers to access early buyers. Results show that start-ups used personal relationships for their first contact with small or medium firms while large suppliers generally use personal relationships across all buyer sizes. The difference lies in meeting large and giant buyers; start-ups relied on their personal relationships to meet large and giant buyers in only in 20% and 0% of the cases respectively. The start-ups overcame their outsider stance by using indirect contacts, phone calls and trade shows. Qualifying those indirect contacts by going back to the responses to the questionnaire, it can be seen that they are typically integrators or Value-Added-Resellers (VARs) that introduce the parties. In this manner, the start-ups accelerated the relationship building process by associating themselves with a community (integrator, VARs) close to the large buyer. Just as a family is more likely to develop a relationship with an adjacent neighbour than one from down the street [9], buyers are more likely to develop stronger bonds within their ecosystems than outside of them

The results for hypothesis 8 suggest that early buyers found lower value in the start-ups' product offer. In 36% of the cases, start-ups were selected based on the new product's functionality/price while only 5 % of the large suppliers were selected for that reason. Buyers were 7 times more likely to select a start-up for its functionality/price ratio.

The results obtained from testing hypothesis 9 indicate that large suppliers involved customers in their new product development processes to a much greater extent

than start-ups did. Start-ups did not involve their early buyers in product development in 43 % of the cases. In contrast, large suppliers did not involve their early buyers in product development in only 16 % of the cases. When start-ups did involve their early buyers in product development, it was mainly to test the new product. Large suppliers involved their early buyers throughout the product development cycle.

Correlation results also show that collaboration is a strong indicator of loyalty. When buyers and suppliers increase their collaboration, buyers are more willing to remain loyal to the same suppliers.

This concludes the discussion on hypotheses that were not rejected. The following is a discussion of those that were rejected.

The results led to the rejection of hypothesis 10. Results suggest that early buyers trusted start-ups as much as they trusted large buyers. Early buyers gave start-ups almost perfect scores for all three measures of trust. Keeping in mind that all sales efforts examined were successful, it seems fair to conclude that trust is a conditional barrier the supplier must successfully climb before he/she is allowed to close the early sale. Since trust was defined here as competence, reliability and integrity, a strong display of each is essential for capturing those early sales.

Hypothesis 11 comparing the buyer's commitment towards its supplier was rejected. While the majority of the buyers were not committed to their start-up supplier,

higher level commitments were also recorded. Data analysis revealed that higher level commitments such as longevity commitment and attitudinal commitment were facilitated by prior personal relationships between buyer and seller. Indeed, those buyers reporting a higher level of commitment towards their start-up suppliers had been initially introduced them via personal contacts.

The rejection of hypothesis 13 suggests that there was no difference in the buyer's loyalty towards either type of suppliers. However, a closer investigation of the loyalty data revealed that many buyers of start-up products were unsure (40 % responded "Don't know") regarding the possibility of buying from the same vendor again in the future. Buyers of large suppliers were more decisive regarding their loyalty; they all attributed a score for their intended loyalty.

The rejection of hypothesis 14 means that start-ups and large suppliers developed the same buyer-seller relationship strength with their respective early buyers. Of the five relationship attributes, only the value attribute was different.

Most of the purchase decision-making process hypotheses were rejected but the data analysis offered some insights. First, while 85 % of the firms confirmed the existence or rules, policies and procedures for the procurement process in their organisation, this formal process was followed only to "Some" or "Moderate" extent. By contrast, buyers had "Large" and "Considerable" discretion in choosing the product for the solution and the supplier to provide it. This finding means that the examined

suppliers either targeted buyer firms where the procurement process was not formal or where the buying centre had much discretion despite the existence of the rules and procedures in place.

A second important finding is the presence of the CEO or COO on the buying committee when purchasing from start-ups. The CEO or COO was present in 80% of the purchases involving start-ups and 40% of the purchases involving large suppliers.

8. CONCLUSIONS, LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

8.1 Conclusions

This research compared the early sales of new products for two supplier types: start-ups and large suppliers.

Results suggest that:

- Start-ups are often selected for their high functionality/price ratio (results of hypothesis 8)
- Buyers trust their start-up suppliers as much as they trust their large suppliers (results of hypothesis 10)
- Start-ups mostly sell to early buyers that are smaller and within their own geographical area (results of hypotheses 1 and 2)
- Start-ups used a wider mix of sales channels than large suppliers did. Large suppliers almost exclusively sold their new products through direct sales. (results of hypothesis 3)
- The first buyer-seller meeting was often set-up by an individual in the buyer's technical function (results of hypothesis 4)
- Start-ups and large suppliers relied mostly on their personal contacts to generate early sales (results of hypothesis 5)

- Large suppliers involved their early buyers in their product development more than start-ups did. They involved them throughout the entire development cycle while start-ups concentrated their buyer's involvement in the testing stage (results of hypothesis 9)
- The CEO or COO was usually involved in the purchase of a start-up's product (results of cross-tabulation, Table 19)
- Collaboration was a strong driver of loyalty (results of correlation, Table 21)

8.2 Contributions

This thesis makes three contributions.

First, start-ups facing the task of commercialising their new technology-intensive products can benefit from these findings. They can use the findings to refine their sales strategies and devote more effort to executing the activities that similar suppliers undertook to sell their new products.

The second contribution of the thesis is the development of a buyer-seller relationship model. The literature offers insights as to the process of developing a buyer-seller relationship. We also find articles relating trust or commitment to satisfaction or even to speed of product development. However, this thesis is the first to provide a model to measure a buyer-seller relationship.

The third contribution of the thesis is that it highlights the importance of understanding the roles of a buying centre and the importance of establishing technical networks across buying and selling organizations.

8.3 Limitations of the study

Press releases were used to derive the sample on which the results were based. But suppliers cannot always issue a press release when they sell their new products. The buyer must agree to the press release and some are reluctant to announce their selection publicly. A better portrayal of the early sales comparison should find a method to include those unannounced sales.

Some customers may wait until the new product deployment is successful before the announcement is released. If the buyer's experience after the sale is at all disappointing, a press release may not be issued at all. Finding a press release for an early sale usually means that the deployment went well or that the buyer and seller already had a relationship that they were not afraid to disclose. As a result, the early sales examined in this research are probably representative of the best case scenarios.

The results obtained testing hypotheses 4 to 18 should be interpreted carefully given that the sample was derived from the telecommunications, computing and high-tech software industries. I make no claims that the results are representative of other industries unrelated to these fields. Also, only young (< 4 years old) start-ups and very

large suppliers (> US \$ 1 Billion in yearly revenues) were examined. There is no attempt to generalize the results in this thesis to older small firms or medium size suppliers.

8.4 Suggestions for future research

This study compared start-ups and large suppliers that had successfully closed their early sales. Additional research can compare suppliers that sold new products with those that did not. The intent is to identify the factors that differentiate companies that sell new products from those that do not.

This thesis did not link the early sale strategies to the start-up's long-term survival. Instead of looking at strategies that allowed start-ups to close their sales, such a research can investigate early sales strategies that contributed to strengthening the start-ups market position.

Since trust and collaboration were found to be important constructs for early sales, additional research is needed to identify the ways the start-ups and large suppliers can increase them.

A longitudinal study of the buyer-seller relationship after the early sale is closed could reveal the reasons why buyers decided to expand or terminate the relationship.

Such a research could shed much light on potential buyer-seller relationship pitfalls to avoid after the closing of the sale.

Finally, there are parallel between the purchase of a start-up's new product by a buyer and the investing of venture capitalists in start-ups. The variables used in this research could easily be modified to examine the venture capital funding cycle. The intent would be to compare successful/unsuccessful initial investment rounds.

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10. APPENDIX

Sample Buyer Questionnaire

1125, Colonel By Drive, Ottawa, Ontario, K1S 5B6, Canada

Objective

To examine the sales cycle of technologically advanced products from a buyer's perspective.

Instructions

In the statements below, the term "supplier" refers to XXXXX and the term "product" refers to YYYYYY. Note that the answers to the following questions should reflect facts and opinions at the time the first purchase was made.

This questionnaire has been designed so you could complete and return it electronically. Once you have completed the questionnaire, save your answers and attach the file as a reply to the e-mail sent to you originally.

Questions about the survey process or content should be directed to: jloudiad@connectmail.carleton.ca

Thank you for collaborating in this research effort. The information provided will be kept strictly confidential. The research results will be automatically sent to you once they become available.

1. When did your company and the supplier discuss this product for the first time (year/month)?
2. When did your company issue the first purchase order or signed the first licensing agreement for this product (year/month)?
3. Has your company bought other products/services from this supplier prior to purchasing this product? Yes _____ No _____
4. Type an "X" to rate the following statement on a 7 point scale from "Lowest Priority" to "Highest Priority".

	Lowest Priority	Very Low Priority	Low Priority	Medium Priority	High Priority	Very High Priority	Highest Priority
	1	2	3	4	5	6	7
Compared to other solutions your company deploys, the solution the supplier's product enabled is considered:							

5. In order of importance, list the three main reasons (technical or business related) you chose this product over alternatives.

First reason: _____

Second reason: _____

Third reason: _____

6. What value prompted you to select this product? Please use an "X" to select one statement that best answers the question.

The product's technical specifications or price	
The supplier's processes (e.g., customization, convenience of channel, sale terms and conditions, third party products availability, product has become de facto standard, product best fit our system)	
The product's performance (e.g., fastest, smallest, lightest, quality, reliability, ease of use, fast problem resolution, immediate availability, whole end-to-end solution provided)	
The supplier's employees (e.g., trust employees to deliver, employees' ability to solve problems, depends on employees for special skills, employees pay attention to our needs, our relationship with some employees, service excellence)	
The supplier's credibility and other emotional factors (e.g. availability of references, reputation, brand, supplier is market leader/technology leader, our joint investment, our relationship with this supplier)	

7. Regarding the first person in your company to be contacted by the supplier for the purpose of selling this product:

Please indicate that person's functional department: _____

Please, use an "X" to indicate that person's position:

Executive	Executive's Direct Report	Any Other Levels

Please indicate how the supplier was introduced to that person (e.g., through personal contact, trade show, magazine, etc): _____

8. Please, type an "X" on each of the product development stages where one or more of your company's employees participated in the supplier's team meetings and/or product development activities. If you were not involved in any supplier's product development activities, select "None".

Planning (from start to basic product requirements)	
Conceptual Design (from basic product requirements to final product specifications)	
Product Development	
Testing	
None	

9. Are there rules and procedures governing the procurement process in your company (yes/no)? _____ If no, proceed to question 11.

10. Please, type an "X" to rate the following statement on a 7 point scale from "Not at all" to "Great extent".

	Not at all	Limited extent	Some extent	Moderate extent	Large extent	Considerable extent	Great extent
	1	2	3	4	5	6	7
To what extent did your company's rules, policies and procedures govern the procurement process for this product?							

11. Please, type an "X" to rate the following statement on a 7 point scale from "No discretion" to "Complete discretion".

	No discretion	Limited	Some	Moderate Discretion	Large	Considerable	Complete discretion
	1	2	3	4	5	6	7
What level of discretion was available to the people involved in the buying decision process to determine the supplier for this solution?							

12. Who controlled the budget used to pay for the product? If the budget was shared, please report all parties by using multiple "X"s.

Executive	Executive's Direct Report	Any Other Levels

13. Please report the number of people who were involved in the buying decision and use the list below to report the function they represented. For example, type "2" in the row corresponding to "Purchasing" if two people involved in the buying decision came from the purchasing function. No one person should be reported twice. If a person represents more than one function, report only the person's main function.

Total number of people involved in the decision	
CEO/COO	
Finance/Accounting/Controller	
Marketing/Sales/Customer Service	
Manufacturing/Operations	
R&D	
Information Systems /IT	
Purchasing	
Other	

How many of the employees reported in the above table knew the supplier prior to the first meeting? _____

14. Please, use an "X" to select one statement that best answers the question: what level of commitment did you have towards this supplier at the time of purchase?

No commitment. There were no other alternatives.	
We have known/used this supplier for a long time.	
Our company had committed a significant investment already (e.g., time, effort, money) and switching to another supplier would have been wasteful.	
Our company has an established strategic relationship with this supplier and we work to maintain it.	

15. Type an "X" to rate each of the following statements on the 7 point scale from "Never" to "Always". Remember that your answers should reflect facts and opinions at the time the purchase was made.

Overall, this supplier's employees were competent.

Never 1	Rarely 2	Seldom 3	Occasionally 4	Often 5	Frequently 6	Always 7	Don't Know N/A

Overall, this supplier's employees were reliable: they kept their promises, adhered to agreements and delivered on time.

Never 1	Rarely 2	Seldom 3	Occasionally 4	Often 5	Frequently 6	Always 7	Don't Know N/A

Overall, this supplier's employees had high integrity: they were honest, they did not make false claims, they did the right things for us and maintained confidentiality.

Never 1	Rarely 2	Seldom 3	Occasionally 4	Often 5	Frequently 6	Always 7	Don't Know N/A

We have linked our systems, procedures and routines with those of this supplier.

Never 1	Rarely 2	Seldom 3	Occasionally 4	Often 5	Frequently 6	Always 7	Don't Know N/A

We have shared important, proprietary, and confidential information with this supplier.

Never 1	Rarely 2	Seldom 3	Occasionally 4	Often 5	Frequently 6	Always 7	Don't Know N/A

Our employees and this supplier's employees have considered each other's interests when resolving conflicts and solving problems.

Never 1	Rarely 2	Seldom 3	Occasionally 4	Often 5	Frequently 6	Always 7	Don't Know N/A

This supplier's employees have routinely communicated with various departments in our company.

Never 1	Rarely 2	Seldom 3	Occasionally 4	Often 5	Frequently 6	Always 7	Don't Know N/A

This supplier's employees have had access to executives in our company.

Never 1	Rarely 2	Seldom 3	Occasionally 4	Often 5	Frequently 6	Always 7	Don't Know N/A

Our company will use this supplier in the future.

Never 1	Rarely 2	Seldom 3	Occasionally 4	Often 5	Frequently 6	Always 7	Don't Know N/A

Our company will use this supplier for other products/services in their portfolio in the future.

Never 1	Rarely 2	Seldom 3	Occasionally 4	Often 5	Frequently 6	Always 7	Don't Know N/A

Our company will pay a slight premium for this product due to its special value to us.

Never 1	Rarely 2	Seldom 3	Occasionally 4	Often 5	Frequently 6	Always 7	Don't Know N/A

15. Please, use an "X" to indicate your company's annual revenues for the year the product was purchased (\$US).

< \$8 M	\$ 8 M < revenue < \$100 M	> \$ 100 M

The information below is not mandatory, but would allow us to contact you should additional information be required.

Name:

Position:

Your Business Telephone Number:

Your Business Address: