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Low power, high ambitions: New ventures developing their first supply chains

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ABSTRACT

This paper investigates sourcing decisions for new ventures. Sourcing decisions are especially problematic for start-ups because they lack resources, knowledge and legitimacy to evaluate and interact with suppliers. We develop and apply a framework that connects global sourcing, relationship development and attractiveness. Further, we investigate how new ventures develop their first supply chains by conducting an exploratory multiple case study of six Norwegian start-ups. Based on our findings, we develop three propositions regarding how start-ups mediate their lack of attractiveness through pre-sales and by choosing shorter supply chains and smaller suppliers. The implications for practice include emphasizing the importance of developing a business relationship with the supplier in parallel with making sourcing decisions. This study is a novel contribution to an underexplored topic, and we conclude by proposing a research agenda for future explorations of start-ups and supply chain development.

1. Introduction

New ventures are increasingly developing and commercializing novel manufactured products (Mollick, 2014). This growth is the result of several global trends that have increased the availability of new technologies and services for start-ups developing physical products – also referred to as hardware start-ups (DiResta et al., 2015). The last few years have seen high growth in rewards-based crowdfunding opportunities such as Kickstarter and Indiegogo; these allow new companies to globally pre-sell the most niche products before even finalizing their prototypes. As 3D-printers have become a part of the public domain and off-the-shelf components can be directly sourced from anywhere in the world at a low cost, prototyping new physical products is easier, cheaper and faster than ever before. Sourcing decisions have always been important to start-up performance, and due to these recent developments in global availability, they have become important in even earlier phases of start-up development. The supply chain is developed in parallel with the first product and the start-up itself. This implies, for instance, that mobilizing the suppliers' technological and managerial capabilities has become more important than cost-efficiency concerns (La Rocca and Snehota, 2020).

When it comes to supply chains, the start-ups exploring and

exploiting these recent global trends share certain traits with other start-ups and small firms. For instance, previous literature has established the supplier–buyer relationship as one of the most important factors to start-ups' success (Song et al., 2011). Further, start-ups' small size and novelty are a liability (Stinchcombe, 1965); and, when forming business relationships, their lack of legitimacy (Zimmerman and Zeitz, 2002) makes them less attractive to potential suppliers (Mortensen, 2012). Start-ups are usually unable or unwilling to engage in direct control strategies, thus relying on informal relations and communication in their supplier relationships (Ellegaard, 2006). Finally, start-ups do not have functional specialists to handle purchasing (Manzer et al., 1980). Supply chain decisions are critical for start-up survival, as they generally lack tangible resources and thus require speedy development (Das and He, 2006) to avoid continued losses (Weiss, 1981). However, this literature was primarily developed in contexts where supply chain decisions were made later on in the firm development process and based on less available information about potential suppliers.

In one sense, the start-ups engaging in these recent global trends resemble international new ventures (Oviatt and McDougall, 1994) since they are exploiting opportunities across national borders from the beginning without sequential entry into different countries. However, the international new venture literature tends to focus more on

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international customers than on international suppliers. In contrast, the latter are found in the sourcing literature, but there is a paucity of work on how start-ups develop their supply chains (Jia et al., 2017) – instead, the sourcing literature tend to focus on established companies.

The business-to-business (B2B) literature contains a few studies on start-ups' development of supplier relationships (La Rocca et al., 2019), technology sourcing (Jolly and Thérin, 2007), operations outsourcing (Bhalla and Terjesen, 2013) and new ventures as suppliers for established firms (Zaremba et al., 2017). These studies indicate that liabilities of newness limit start-ups' power to secure supplier involvement and resources (Bhalla and Terjesen, 2013), whereas (if mobilized) supplier relationships simultaneously provide benefits beyond component supply (La Rocca et al., 2019; La Rocca and Snehota, 2020). However, compared to the B2B literature on suppliers and established companies (e.g. Mota and de Castro, 2005), and even customers and start-ups (e.g. Aaboen and Aarikka-Stenroos, 2017), the B2B literature on how start-ups develop their supplier relationships is still in its infancy.

The recent developments in global sourcing combined with limited sourcing literature for start-ups has shown that sourcing may be particularly important and problematic for start-ups. Therefore, we investigate how new ventures develop their first supply chains. We accomplish this by studying six hardware start-ups and their processes from prototyping and searching for suppliers to producing their first commercial product.

The paper is structured as follows. In the theoretical framework section, we combine literature on operations management, supply chain management and B2B relationships to create a framework that allows us to analyse the development of the first supply chain relationships. The third section on method explains how we collected data on the six hardware start-ups and their development of first supply chains. Section four presents the details of the case studies. After a cross-case analysis in section five, we provide a discussion, suggest an agenda for future research and conclude.

2. Theoretical framework

Stanczyk et al. (2017) identified the need for improved global sourcing management in a systematic literature review of the dark side of global sourcing. They found a lack of understanding of the risks of global sourcing, especially the dynamic and hidden costs, firm-internal barriers and decision-making biases (Stanczyk et al., 2017). According to Jia et al. (2017), earlier literature has treated global sourcing strategy and global sourcing structure as two separate subjects. However, because two of the main challenges companies face today are the complex organizational structures coming with global sourcing and managing them, these processes should be seen as interlinked and include the following (Jia et al., 2017):

- Global sourcing strategy
 - o Goals (cost-reduction, resource-seeking or market-seeking)
 - o Policies and plans (internal integration, supply internationalization, external integration)
- Global supply chain structure
 - o Structural design (organizational complexity, allocation of decision-making power and specialization)
 - o Control and coordination (coordination mechanisms, control mechanisms, information and communication technology capabilities)

Fredriksson (2011) formulated three questions that must be answered during the global sourcing process: *what to source, who is most suitable to take over the responsibility and become a supplier and how the structure and coordination between the focal company and the supplier should be established and managed*. The first question, *what to source*, relates to Jia et al.'s (2017) sourcing strategy. According to them, small- and medium-sized enterprises (SMEs) adopt fewer formal or explicit

strategies than multinational companies. Therefore, the *what* question is easy for start-ups to answer, as they only have a few (at most) products. The second (*who*) and third (*how*) questions are often challenging for start-ups to answer; therefore, their goal is to find a supplier who can supply them somewhat in accordance with their demand (i.e. become a preferred customer) (Steinle and Schiele, 2008). The *who* and *how* questions can be further described using the global supply chain structure category dimensions Jia et al. (2017) developed; these are further elaborated upon below.

2.1. Structural design

Local or offshore sourcing depends on how companies decide to structure their supply chains (i.e. how the links and nodes of the supply chain are organized). The essential decision here is who to select as a supplier (the second question of *who to source from*). Global sourcing strategies use goals, policies and plans to identify future suppliers' characteristics. However, the final decision of who to contract forms part of the structural design because – depending upon how the contracts are drawn up – it describes the relationship between the focal company and the suppliers (Jia et al., 2017). Depending on the structural design, power in the supply chain will differ, and depending on power structure, the control the focal companies have over their suppliers will also differ. Focal company control of the supply chain refers to the ability to make the actors in the supply chain coordinate with the focal company's needs (Fredriksson, 2011). Studies show that developing business relationships and integrating processes may be especially difficult within relationship-focused cultures, such as China (Handfield and McCormack, 2005). Chinese managers expect to see their suppliers and partners in person much more than their European counterparts (Song et al., 2007); further, they expect social meetings before they discuss business, which means negotiations take longer (Handfield and McCormack, 2005; Song et al., 2007).

Aaboen and Fredriksson (2016) found that when an outsourcing relationship develops, dependence and power gradually shift between the supplier and the customer; further, their relationship sets a precedent for the types of relationships that can be developed between the supplier and its (sub-)suppliers. Because new firms typically lack networks, business experience, a proven performance record and have limited resources and legitimacy (Pena, 2002; Stinchcombe, 1965; Zhang and Li, 2010), they usually have very little power and control in the supply chain, allowing the supplier to become more powerful.

2.2. Control and coordination

The third question of *how to source* is related to control and coordination, as it includes issues such as coordination mechanisms, control mechanisms and information and communication technology capabilities – all of these are essential parts of the actual physical exchange as well as the planning of the same. Global sourcing creates supplier-related risks due to legal, political, financial and cultural differences (Fawcett and Birou, 1992). Differences in culture can lead to low delivery precision or quality issues (Fredriksson and Jonsson, 2009) because differences in culture, language, practices and time zones diminish the effectiveness of information-dependent business processes like demand-forecasting and planning (Mattsson, 2002; Meixell and Gargeya, 2005; Mol et al., 2005; Levy, 1995). For example, communication in a language that is neither party's mother tongue combined with different cultural contexts can affect how messages are interpreted.

In relation to knowledge, complexity measures the inherent variations in combining different kinds of competencies (Zander and Kogut, 1995). Complexity has been found to degrade transfer performance because it slows the learning process (Cheng et al., 2010; Galbraith, 1990; Salomon and Martin, 2008), requires more sophisticated training (Cheng et al., 2010) and demands more information-processing (Stock and Tatikonda, 2000). Product complexity comprises three main

elements: the number of parts in the bill-of-material, product architecture and where each product is located in the product lifecycle (e.g. engineering changes are more frequent early on in the product lifecycle) (Novak and Eppinger, 2001). Furthermore, a novel product usually needs frequent adaptations and changes, which demands a working relationship with suppliers featuring open communication to avoid costs related to changes in function, design or work schedule (DiResta et al., 2015). A novel product is the norm for start-ups.

Overcoming these challenges requires communication and logistics capabilities within the supply chain (Fawcett and Birou, 1992), which start-ups often lack. Another way to handle this is flexibility. Tachizawa and Thomsen (2007) defined supply flexibility as the ability of the purchasing function to respond in a timely and cost-effective manner to the changing requirements of purchased components in terms of volume, mix and delivery date. According to Duclos et al. (2003), flexibility in the supply chain adds the requirement of flexibility within and between partners in the chain, dependent upon how easily the organization can adapt its logistics, supply, organization, information system and market and operations system to changes in the supply chain (Duclos et al., 2003). As start-ups usually lack most of these abilities, it is hard for them to attain the flexibility needed to handle complex global supply chains.

2.3. Relationship development

The literature on relationship initiation describes several different processes divided into stages, states and phases. The major difference between them is whether it is possible to move between the phases in any manner or whether this movement is pre-determined. More recent models hold the view that the relationship can develop multi-directionally between states (e.g. Batonda and Perry, 2003; Edwards-son et al., 2008; Halinen, 1997). There are also some differences regarding how the process begins and ends. For a review of the relationship initiation literature and the sub-processes in the phases of the initiation process, see Aaboen and Aarikka-Stenroos (2017). Drawing on their literature review, we use the following sub-processes: need identification, matching, attraction, accessing, defining exchange, building conditions and forming the future (see Fig. 1). The first sub-processes include carrying out the initial search and connecting with the potential producer. There is an overlap between the phases, and the boundaries between them are rather fuzzy. Matching, attraction and accessing all have to be in place to initiate a relationship. Defining exchange is an important sub-process since this is where the start-up and supplier interact and negotiate in order to agree on the intended content and type of the relationship (i.e. the *how* question). The relationship is very fragile

during this sub-process because the parties need to come to a mutual understanding even though they lack experience with one another (Aaboen and Aarikka-Stenroos, 2017; Edvardsson et al., 2008). After the exchange has been negotiated, the process model continues to cover early interactions, which are crucial to the future of the relationship.

2.4. Attractiveness

Attractiveness literature builds on social exchange theory and focuses on how to become a preferred customer. ‘Customer attractiveness is based on the expectations that a supplier has towards the buyer at the moment of initiating or intensifying a business relationship’ (Schiele et al., 2012, p. 1180). Becoming a preferred customer is also important for established firms, as it enables them to get higher quality and better prices than other customers. This may be particularly important in markets with few suppliers (Nollet et al., 2012). In addition to describing how to become a preferred customer, including how to ‘sell’ the company to the supplier, the literature emphasizes which factors are important in this process. The initial transactions are particularly important, as is the fit between the companies, how well the relationship works and the perceived interest in the supplier’s activities, business models and development plans (La Rocca et al., 2012; Nollet et al., 2012). Unfortunately for start-ups, suppliers tend to value performance level, economic outcomes, long-term relationships and secure revenues. Hence, other factors are critical for start-ups.

2.5. Analytical framework

Fig. 1 shows our analytical framework, including the relationship between the global sourcing process (strategy and structure) and the relationship-initiation process. The left side illustrates the important issues of *what to source*, *who to source from* and *how to source* from the global sourcing literature. The right side shows the sub-processes of relationship initiation. As Fig. 1 illustrates, the issues in the global sourcing literature are primarily connected to different sets of sub-processes in the relationship initiation that takes place in parallel with the sourcing process. The *what to source* question of the global sourcing process is equal to the ‘need identification’ of the relationship initiation process, as both aim to establish what product or component is in focus for both processes. The *who to source from* question of the global sourcing process corresponds to the matching and accessing phases of the relationship initiation process, as these aim to find the future supplier and evaluate them. The *how to source* question of the global sourcing process matches the defining exchange, building conditions and forming the future phases of the relationship initiation process. These all attempt to

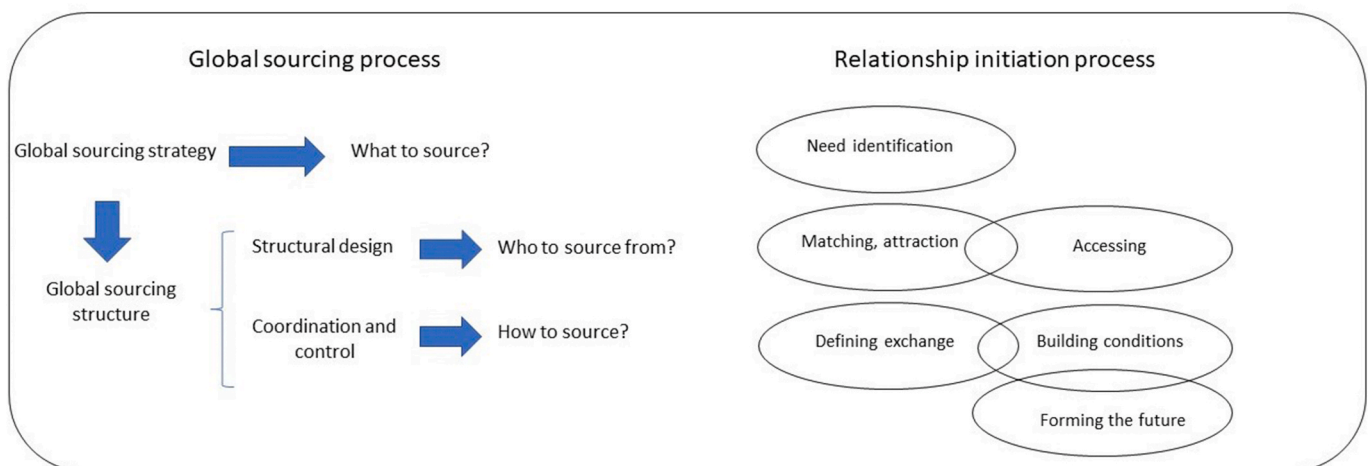


Fig. 1. Analytical framework – The parallel processes of global sourcing and relationship initiation for start-ups developing their first supply chains.

identify how to establish the physical exchange as well as the information exchange needed for planning it. Since the relationship can develop multi-directionally between states, both parallel processes become iterative. Consequently, when analysing how start-ups develop their first supply chains, we focus on how the relationship development process is connected to the global sourcing process.

3. Method

We conducted an exploratory multiple case study of the supply chain development processes of six hardware start-ups to investigate how new ventures develop their first supply chains. In this context, we define a hardware start-up as a start-up developing and selling physical products. In total, we contacted 10 different firms, all Norwegian start-ups that had initiated and/or completed mass production of novel products. However, four of these were not able or willing to participate in the study. Table 1 provides an overview of the selected cases.

In order to confirm that a venture matched the criteria for being included in our study, we pre-emptively collected publicly available data from different sources such as webpages, blogs and Kickstarter campaigns (which four firms had conducted); these included information about the case companies and their potential production partners. In addition to gaining deeper knowledge and understanding of the cases, this search prepared us for the interviews and validated some of the information from the interviews. We conducted in-depth interviews with the individuals from the selected ventures who were primarily involved in developing the supply chain. We interviewed the CTO and CEO of Plasttech, the CEO of Flytech, the CEO of Magtech, the CEO of Sporttech, the product manager of Textiletech and the founder (ex-CEO) and supply chain manager of Camtech.

The interviews took place at the start-ups' offices and lasted for about an hour each. We informed the interviewees about the general interview topics beforehand; two members of the research team were present for each interview. The topics covered during the semi-

Table 1
Overview of the case studies.

Company	Main product parts	Approx. time from first supplier talks to mass production	Delayed shipping according to plan	Previous manufacturing experience
Plasttech	Plastic lenses (critical component), injection-moulded plastic, fabric	6 months	On time	No experience in start-up team
Textiletech	Textiles and batteries	14 months	On time	Product manager with sourcing experience from China
Magtech	Magnets, injection-moulded plastic	19 months	Around 5 months	No experience in start-up team
Sporttech	Electronics, optics, plastic	20 months	Around 13 months	No experience in start-up team, partnered with advisory firm
Flytech	Electronics, camera, engine	18 months	Around 8 months	Hired two employees with experience sourcing from China
Camtech	Electronics, camera	30 months	Around 12 months	No sourcing experience, but hired supply chain manager after two years

structured interviews included the start-ups' current supplier situation, how the supplier selection process was initiated, how the first manufacturers to be approached were identified, the interaction and relationship with the suppliers and how production was organized. Each interviewee was interviewed once, but additional follow-up questions were asked via e-mail to clarify important issues that arose during the analysis. We recorded and transcribed all the interviews. By manually coding specific phrases in the interviews using an inductive approach, we reduced the data to 15–25 emerging themes depending upon the case company. Examples of emerging themes are supplier search methods, geographical proximity, liability of newness and screening process. We then systematically organized the categories in an Excel sheet for each case company and analysed each case company one-by-one based on our analytical framework (see Fig. 1). Afterward, we designed tables based upon the emerging themes and performed a cross-case analysis (Eisenhardt, 1989; Miles and Huberman, 1994) by analysing and identifying differences, similarities and patterns across the case companies.

To further increase the credibility of the research, we took several measures that Yin (2009) suggests. We strengthened our *construct validity* via researcher triangulation (two researchers conducted interviews and analysis), data triangulation (we used secondary data when possible) and by returning transcripts to the interviewees to avoid errors and misunderstandings. To ensure *external validity*, our multiple case study research design features replication logic (Eisenhardt, 1989). We strengthened the *reliability* of the study by thoroughly presenting the case companies and using a separate cross-case analysis; we also included quotes from the case companies (in Table 2) to illustrate how the empirical results are connected to the analytical framework.

4. Case presentations

4.1. Plasttech

4.1.1. What

Plasttech's first product targets the consumer market and consists of approximately ten different components. These are mostly off-the-shelf components except for the optical lenses, which are key to the final product.

4.1.2. Who

Initially, the start-up wanted to have local Norwegian suppliers and visited nearby plastic producers and contract manufacturers; however, it did not find any who were both capable of and interested in such small-batch production. Instead, it used [Alibaba.com](https://www.alibaba.com) to identify and contact potential suppliers located worldwide. It conducted its first screening process for plastic component suppliers entirely by assessing supplier websites, suppliers' email responses, language barriers and how interested the suppliers seemed to be in the product. When explaining why it ended up with the specific plastic supplier, the CTO stated that 'at first, it was only our gut feeling that this was good quality, because we didn't actually know how to test quality', illustrating the start-up's limited experience. After selecting the plastic supplier, Plasttech travelled to China for closer assessment and to screen suppliers of other components. This visit was decisive both for the structure of the supply chain and for choosing the suppliers: the team was so satisfied with the selected supplier that it became their contract manufacturer.

4.1.3. How

Plasttech established a primary relationship with a contract manufacturer in China, which in turn sourced over ten non-critical components from Chinese sub-suppliers and assembled the final product.

4.1.4. Business relationship

The contract manufacturer was a relatively small Chinese firm with a CEO who was 'personally engaged and had an entrepreneurial mindset'. According to Plasttech, the personal relationship with the CEO was

crucial to the company's rapid progression from prototype to commercial product, especially when it came to navigating the vast number of potential Chinese sub-suppliers and setting up the supply chain. However, to speed up the production process, Plasttech needed to be present in China, as its small size meant it was given low priority. For example, just before manufacturing the first batch (2000 units), one sub-supplier pulled out because of a larger order that suddenly presented itself. In this case, the contract manufacturer fixed the problem to avoid delays.

4.2. Textiletech

4.2.1. What

Textiletech developed a relatively simple consumer product that consisted of textiles, batteries and heating elements. It was clear from the very beginning that it would outsource all of its components and production to suppliers.

4.2.2. Who

With its relatively simple product consisting of batteries and textile, China was the start-up's first priority. Using [Alibaba.com](https://www.alibaba.com), Textiletech quickly narrowed its search to Chinese textile manufacturers with additional experience in clothing featuring heating elements and batteries. When screening suppliers, Textiletech deliberately sent a specification with some minor errors to 'test the suppliers' interest and competence level'. Its initial supplier criteria were price, communication, response time and interest in the product. Being a very small start-up with no references, Textiletech had a limited pool of interested suppliers. In addition, the start-up did not want to deal with a large number of suppliers due to the increased time and cost related to testing and negotiating with several suppliers.

4.2.3. How

Textiletech's only relationship is with its contract manufacturer, which has all the components in-house. It chose this supply chain structure because its small size made it difficult to manage a supply chain when the contract manufacturer was far away.

4.2.4. Business relationship

At the time of the interview, the start-up had developed a good relationship with its key supplier and was preparing for mass production. Textiletech's good relationship with its contract manufacturer made it possible to cut the minimum order quantity from 1000 down to 300 before starting production.

4.3. Magtech

4.3.1. What

Magtech has developed a simple and innovative consumer product. It began its search for suppliers by dividing its production process into three jobs: the key product component, the plastic components and final assembly.

4.3.2. Who

Early on, again with the help of [Alibaba.com](https://www.alibaba.com), Magtech identified a Chinese supplier for testing an injection mould; however, this supplier did not attempt or suggest any improvements on the product or process, and the resulting manufactured test parts broke down. This experience with an inactive supplier and poor quality convinced the start-up to focus its supplier search on Norwegian firms only. Using its network, Magtech identified five relevant Norwegian suppliers that could manage the sourcing of components and final assembly. Magtech contacted and visited them, but having never worked with start-ups before, most of these firms were reluctant to engage in such a collaboration. However, it selected the one supplier that was pro-active and interested in the start-up's product to be the contract manufacturer. Magtech was certain that this supplier was professional and had high-quality products, as the CEO

illustrated: 'We chose a Norwegian supplier because we felt safe that it would not fail'. Feeling secure about the chosen contract manufacturer, Magtech did not specify its requirement in a contract nor provide written terms for the supplier relationship. In addition, the start-up did not conduct any testing of sample quality from the contract manufacturer before launching a pre-sale campaign of its first product. After a very successful pre-sale campaign (overselling its target by 800%), the contract manufacturer increased its price by 400% overnight due to production problems. In addition, the quality of the finished product was below Magtech's expectations, causing Magtech to want to quit the collaboration. Incidentally, the successful pre-sale campaign attracted a Chinese supplier that suggested it could produce the key component instead. Utilizing its experience from dealing with its former Norwegian supplier when entering into the screening process and negotiations with the new supplier, Magtech signed a deal with the new supplier after travelling to China to meet the supplier and inspect its facilities.

4.3.3. How

In the first supply chain setup, all the suppliers were Norwegian, and Magtech had a relationship with each of them. In the final supply chain, all the suppliers were in China. In this case, the Chinese contract manufacturer oversaw the sourcing and assembly of the final product in China. The new China-based supply chain consisted of seven suppliers, and Magtech had direct contact with two of them.

4.3.4. Business relationship

The start-up selected its first supplier and organized its supply chain based mainly on 'gut feeling'. This supplier had not worked with start-ups before, and the good collaboration between the firms only lasted until production started.

4.4. Sporttech

4.4.1. What

Sporttech has developed a new camera product for the consumer market. It consists of tens of different components, with plastics, electronics and software being the central parts. Although most components are off-the-shelf, the final product ranks at the top of its product category, which demands high quality from the contract manufacturer.

4.4.2. Who

The start-up chose to bypass Norwegian suppliers of electronic components from early on: 'We wanted to go directly to the source in China'. However, after discovering that sourcing from China was too complicated, Sporttech contacted various international advisory firms specializing in setting up global supply chains for start-ups. It chose a Norwegian advisory firm because of physical proximity and because 'it felt right'. The Norwegian partner ended up providing the start-up with access to an American supply chain company operating in China that had a large network of suppliers and manufacturers in China. Its business idea was to manage the supply chain and negotiations with suppliers on behalf of customers such as Sporttech. The supply chain company offered to organize the whole process, from sourcing to final product assembly. However, Sporttech insisted on testing all components from the suppliers themselves since quality was its most important selection criterion, and because it also wanted to be able to choose different suppliers in the final supply chain. Sporttech did not have any direct contact with suppliers except through the supply chain company, with the latter also conducting the commercial assessment of these (sub-)suppliers.

4.4.3. How

Sporttech's relationship with the Norwegian advisory firm was central in 'making us ready for manufacturing' and learning to be very specific when ordering components. The American-Chinese partner was central in managing the entire Chinese supply chain, negotiating with

sub-suppliers and forming specifications.

4.4.4. Business relationship

The ongoing relationship with the Norwegian partner has been key in enabling Sporttech to manoeuvre among Chinese suppliers. It also provided the link to the American–Chinese supply chain company. In retrospect, the CEO stated that Sporttech should have spent more time in China – closer to suppliers and partners – to avoid delays and misunderstandings.

4.5. Flytech

4.5.1. What

Flytech sells a complex consumer product. Some components, such as the engine and the printed circuit board (PCB), are customized and are critical for the final product. Most of the other components are typical off-the-shelf parts, such as electronic components and the battery, with almost all the potential suppliers located in China and East Asia.

4.5.2. Who

Flytech mainly identified suppliers by inspecting components in other quality products, finding out who made them and testing samples of these components. [Alibaba.com](https://www.alibaba.com) was a major source in this search, which led to a great deal of ‘hit and miss’, according to the CEO. In the selection process, product quality was central, but supplier interest in and engagement with Flytech’s product were also important criteria. Therefore, after initial testing, Flytech travelled to China to visit the suppliers of its preferred components. This was important not only because Flytech could then investigate the suppliers more thoroughly, but also because the suppliers themselves appreciated these visits and personal meetings. During the prototyping period, Flytech carried out a successful pre-sale through its own website, granting it international publicity. This pre-sale prompted one of the most renowned Chinese suppliers to make a deal with Flytech. However, the start-up soon discovered that the renowned supplier did not manufacture the selected components themselves but instead had their own suppliers or sub-suppliers manufacture components intended for Flytech. Not only did the Chinese manufacturer fail to communicate this to Flytech, but there were large implications for quality, since the provided components were not the same as the samples that Flytech had tested, all of which led to a search for new suppliers and further delays. Because of these difficulties, the company decided to move the assembly line, PCB manufacturing and the final product testing closer to Norway. Flytech eventually ended up with a local Norwegian contract manufacturer.

4.5.3. How

The first supply chain involved the production of PCBs and final assembly in Norway, whereas Flytech sourced the other components from Chinese suppliers. The automated production line made the price differences with an alternative China-based production line small.

4.5.4. Business relationship

In general, the company realized it could only solve issues related to delivery and quality by being present on site. Although ‘a lot gets lost in translation’, as the CEO put it, being personally present was key in solving problems and overcoming barriers related to language, culture and business practices. However, gaining a complete overview of the supply chain to avoid delays was hard because Flytech did not have enough resources to maintain a permanent presence in China. Compared to China, switching to the Norwegian contract manufacturer and plastic supplier sped up the process and reduced communication problems so much that the gains outweighed the extra manufacturing costs.

4.6. Camtech

4.6.1. What

Camtech sells an advanced camera product for both the business and the consumer markets. In addition to homemade software, the product consists of optical, electronic and plastic components. Although these are mostly off-the-shelf components, Camtech demands high quality. The initial start-up team had experience in R&D and product development within the global electronics industry but no direct experience with suppliers, the manufacturing process or supply chain development.

4.6.2. Who

Initially, Camtech had a list of preferred Chinese suppliers based on previous work experience and what competitors, especially the big ones, were doing, as illustrated by the start-up’s founder: ‘If GoPro changes supplier, there has to be some important reason for that’. The strategy was to ‘get out there’ and visit potential Chinese suppliers from the very beginning. However, the start-up found it hard to gain acceptance among large suppliers and had to agree to an offer from its third choice among contract manufacturers. The first test production was well-received by potential customers, resulting in a large product order from a global market leader and an injection of venture capital. This initial success gave Camtech the necessary resources to invest in a new supply chain set-up and allowed it to hire new people with global supply chain experience. After evaluating potential contract manufacturers globally, the firm chose a local Norwegian supplier. The main reasons for this were as follows: the proximity between manufacturing and R&D saved time and travel expenses, the smaller Norwegian contract manufacturer gave Camtech higher customer priority than the former larger Chinese contract manufacturer, and the supplier relationship was more open and trust-based.

4.6.3. How

The first supply chain, which produced a test series, was entirely Chinese. Although the Chinese contract manufacturer managed the supply chain and production, the start-up also had direct contact with second-tier suppliers. The first *commercial* supply chain consisted of a local Norwegian contract manufacturer with Chinese sub-suppliers. Camtech formed relationships with all the sub-suppliers in this setup.

4.6.4. Business relationship

The first contract manufacturer focused more on quantity than quality; further, communication was poor. The start-up learned the hard way that ‘a yes is not necessarily a yes – things will not always get done. You need communication experience’. Language barriers with the Chinese contract manufacturer made communication unnecessarily complicated. These difficulties became visible in the relationship phase of defining exchange (before the first commercial batch was produced). The relationship with the Norwegian contract manufacturer was more trust-based.

5. Cross-case analysis

Since all of the case companies are unknown start-ups, they typically have low control and power in the supply chain, which means suppliers can more easily dictate the relationship, such as by changing sub-suppliers (as in the case of Flytech) or prioritizing other customers (as in the case of Plasttech). We can divide the case companies into two groups based on the complexity of their products. For Group 1 (consisting of Plasttech, Magtech and Textiletech), the lack of control and power in the supply chain is somewhat reduced by sourcing simpler products whose components are easily identified in the market, making it relatively easy to identify new suppliers. Group 2 (consisting of Flytech, Sporttech and Camtech) initially has considerably more complex products than Group 1, as they make more electronic products with many different electronic, optical and mechanical components and a

Table 2
Cross-case analysis illustrating challenges and solutions.

Company	Quote	Challenges in establishing GS network		Solutions to challenges
		Structural design: <i>Who to source from</i>	Control and coordination: <i>How to source</i>	
Group 1: Low product complexity and mainly market and modular structures				
Plasttech	‘We used Alibaba to contact potential Chinese suppliers. But actually, Alibaba is a sales channel for them, so perhaps we came off as a bit unprofessional’. ‘The day before our first 2000 units were to be produced, our box manufacturer suddenly got a much larger order and just said it didn’t want to supply us anymore’.	Identifying and screening suppliers	Low attractiveness among suppliers	Using Alibaba.com to increase the pool of potential suppliers Reduced complexity and increased control by using a Chinese contract manufacturer to manage the supply chain
Textiletech	‘Suppliers did not bother meeting us at conferences or talking to us until they were certain we could order their minimum order quantity’. ‘I think it was a good choice to choose only one supplier to have a relationship with that integrates textiles, battery and heat elements. Two extra suppliers could have been chaotic’.	Low attractiveness when engaging suppliers	Long distance to China, challenging communication	Using Alibaba.com to increase pool of potential suppliers to contact and screen The Chinese contract manufacturer manages a small Chinese supply chain, increasing coordination and control and limiting complexity.
Magtech	‘It sounds rather foolish, but I must admit that we did not ask for any samples before signing the contract [with the supplier]. We believed we could trust a Norwegian firm’. ‘Instead of offering a discount for all the errors and delays, it actually raised the price by 400% after our successful Kickstarter campaign’.	Supplier selection process	Developed poor relationship with Norwegian contract manufacturer	Learned from these mistakes when screening next contract manufacturer Switched to Chinese contract manufacturer that was attracted by the successful pre-sale campaign; it managed the new supply chain set-up
Group 2: High product complexity and mainly modular and relational structures				
Sporttech	‘After having met three firms, we thought, since we prefer the Norwegian firm more than two world-leading American firms, what are the odds of meeting someone even better? So, I don’t actually have a rational and logical argument for that choice’. ‘We identified components ourselves, but negotiating prices with Chinese suppliers was difficult. So now our partner negotiates with suppliers for us’.	Selecting supply chain consultancy firm	Smallness and communication problems slowed down supply chain setup	Using unconventional and less resource-demanding assessment criteria based to a large degree on a non-rational ‘gut feeling’ Increased coordination and control by having external partners help setup and manage Chinese supply chain
Flytech	‘We could not speak English with the engineers – we had to use interpreters who did not have technical skills’. ‘Our main supplier got another, smaller supplier to make the component. But this supplier was also too big for us, so our main supplier found an even smaller supplier to make it. We knew nothing about this’.	Communicating with Chinese suppliers	Low attractiveness among suppliers due to smallness increased organizational complexity and lowered control	Using Alibaba.com to increase pool of potential suppliers to screen; presence in China lowered communication issues and increased control Changed to local Norwegian contract manufacturer to overcome communication issues and increase quality control
Camtech	‘It was a challenge to identify [suppliers], but mostly, it was a challenge to be accepted by a large supplier as a five-person Norwegian start-up’. ‘A main problem was poor communication and the contract manufacturer’s lack of taking responsibility for product quality. The contract manufacturer focused mostly on quantity delivered’.	Engaging suppliers	Communication issues and lack of quality control	Presence in China to engage suppliers, but low attractiveness made preferred supplier impossible to get as a contract manufacturer Switched to Norwegian contract manufacturer before first commercial batch to increase control, flexibility and communication

more advanced product architecture. This requires a more complex governance structure, with the start-ups needing to initiate and develop closer relationships with several suppliers to supply high-quality, and sometimes customized, components. This is made even more challenging by the fact that the initial suppliers are global and mostly from China, which lowers the start-ups’ control and power even more. In addition, the relationship-focused business culture of China means the start-ups must invest in relationship development with many potential suppliers, which is time-consuming, expensive and challenging for start-ups.

In [Table 2](#), we illustrate difficulties the case companies faced when designing their initial supply chain. Overall, the main challenges arose early on when the start-ups tried to identify, screen and engage suppliers or later in the relationship when first product testing or commercial batches were underway. For the firms in Group 1, the main challenges were mostly related to the supplier relationships processes of matching,

attraction and accessing (see [Fig. 1](#)). For Plasttech and Textiletech, the main challenge was to identify and engage a contract manufacturer, whereas for Magtech, the challenges arose in the negotiation and testing phases when it experienced quality issues and relationship problems with its Norwegian contract manufacturer. For firms in Group 2, most of the challenges were related to the relationship process defining exchange, such as challenges of being low-priority to suppliers because of low order volumes or quality problems that became magnified by physical distance, distance in the business culture and communication barriers. Thus, as the supplier relationships developed, the initial supply chain setup became too complex to manage and involved too much risk. Accordingly, the start-ups in Group 2 needed to lower the organizational complexity of their sourcing and increase coordination and control before producing their first commercial batches. This process involved both finding new suppliers and redesigning their supply chains. Flytech and Camtech did this by switching their contract manufacturers from

China to Norway. In addition to being closer both physically and culturally, the Norwegian contract manufacturers were much smaller companies than the Chinese ones, giving Flytech and Camtech relatively more control, power and flexibility in the supply chain. In contrast, Sporttech went from doing screening, testing and negotiations itself to utilizing the competences of its supply chain advisory partners to increase control and power in the supply chain (and to reduce complexity).

6. Discussion

In the present paper, we have investigated how new ventures develop their first supply chains. To do this, we use relationship initiation and attractiveness to explain the companies' global sourcing processes. Based on the cross-case analysis and the analytical framework, we will next develop and present three propositions related to start-ups' sourcing decisions.

6.1. Structural design

Opposite to what the traditional global sourcing literature suggests (e.g. Francioni et al., 2019; Bozarth et al., 1998; Steinle and Schiele, 2008; Jia et al., 2017) – that firms use thorough processes for identifying a pool of possible suppliers and select the most suitable from this pool – we can see that the search for suppliers among the case companies was quite different. First, they all focused on a very limited number of markets (either China or Norway/home) and actors. Second, due to limited networks and no prior experience, four of the six case companies used arenas such as [Alibaba.com](https://www.alibaba.com) to identify possible suppliers. Thereafter, they relied on more traditional communication channels such as emails and cold calls when approaching manufacturers. Third, the ventures' selection criteria differed from the selection criteria of established companies due to limited experience, resources and time. The case companies mainly used price and qualitative criteria such as the quality of components, suppliers' interest in the final product or in the start-up, and whether the communication between the companies during the process was adequate or provided a good 'gut feeling' (i.e. a feeling without a logical rationale). This is very different from the more sophisticated techniques and screening criteria used by established firms, such as performance history, warranty, technical capability, delivery or other quantitative criteria (see e.g. Dickson, 1966; Ho et al., 2010). In this way, they kept the organizational complexity of the structural design to a minimum (Jia et al., 2017). However, as will be discussed later, even minimal organizational complexity can be too much for a start-up with scarce resources. This led four of the case companies (Plasttech, Textiletech, Magtech and Sporttech) to actually focus on suppliers with less specialization but with the ability to help them manage the supply chain.

Relationship with the suppliers was of great importance, as the case companies had low legitimacy (Zimmerman and Zeitz, 2002) combined with typically small volumes, making it hard to attract interest and offers from suppliers, especially desirable suppliers. In such circumstances, the decision-making power is almost entirely in the hands of the supplier. However, our findings suggest that pre-sales is one way new ventures can become more attractive. The pre-sale process provides additional financial resources, making it easier to engage suppliers by increasing the new ventures' ability to pay for their orders and emphasizing that the new ventures could become profitable long-term customers – this proved true for Sporttech, Magtech and Flytech. These case companies' pre-sales showed huge commercial interest among end-users, which attracted suppliers. However, public pre-sale and the promise to deliver the final product are connected to goal commitment and the need for achievement. Our findings show that the case companies followed the same pattern that Mollick (2014) illustrated: the firms that were overfunded by the pre-sale process had higher risk of experiencing delays. One reason for this could be that having a

successful pre-sale gives the ventures more funding, which means that they can use more resources and time to find their preferred suppliers. Our empirical findings suggest:

Proposition 1. *During structural design in the global sourcing process, new ventures*

- 1) *use less sophisticated and resource-demanding methods for identifying and screening suppliers than established firms; and*
- 2) *can increase their attractiveness among suppliers with the help of pre-sales.*

6.2. Coordination and control

Our empirical findings revealed that the new ventures lacked the ability to communicate their product components' specifications, thereby leaving them unaware of whether the suppliers understood the specifications and if they in turn had provided the correct specifications to the sub-suppliers. Due to their low attractiveness, the case companies also had problems coordinating and controlling their supply chains (Schiele et al., 2012). This made it difficult to predict whether the manufacturers and their sub-suppliers would prioritize the new venture enough to follow the specifications; in some cases, it was also difficult to know who the sub-suppliers were. The low priority among suppliers is illustrated in the Flytech case, whose supplier sourced components to sub-suppliers without further communication. Further, in Plasttech, its supplier cancelled the order on short notice due to a much larger order from another customer.

For several of the case companies (e.g. Camtech and Flytech), problems were exacerbated by language and cultural differences; further, the lack of resources made it hard to deal with the relationship-oriented culture in China, which demanded presence on site to solve problems (Handfield and McCormack, 2005). In addition to being difficult, the case companies emphasized that relationships that demanded physical presence were expensive and time-consuming, and that these challenges escalate further the more suppliers the new venture initiates relationships with. Established companies have often solved this problem by establishing local joint ventures, founding their own subsidiaries on site in China (Fredriksson and Jonsson, 2019) or even backshoring (see e.g. Kinkel and Maloca, 2009; Di Mauro et al., 2018). In this study, examples of backshoring were seen in Flytech and Camtech – both companies with high levels of complexity in their product and production processes (Group 2). One cause of these problems is the relative ease of finding suppliers in China, causing the case companies to underestimate the problems that their differing cultures and languages create. However, the opposite was also witnessed in Magtech, a company with low complexity (Group 1), who experienced problems with local suppliers in Norway. It underestimated the supply chain risks due to having the same language and culture.

Proposition 2. *During coordination and control in the global sourcing process, new ventures*

- 1) *experience lack of control and coordination due to low attractiveness;*
- 2) *require a short supply chain with a limited number of system integrators; and*
- 3) *combine more readily with comparably small suppliers.*

6.3. The inter-connectedness of the sourcing process and the relationship initiation process

Our framework enables us to show the importance of developing the sourcing process and the relationship initiation process in parallel. As illustrated by Fig. 2 below, 'defining exchange' was the key sub-process for the six start-ups in the present paper. It was in this stage of the

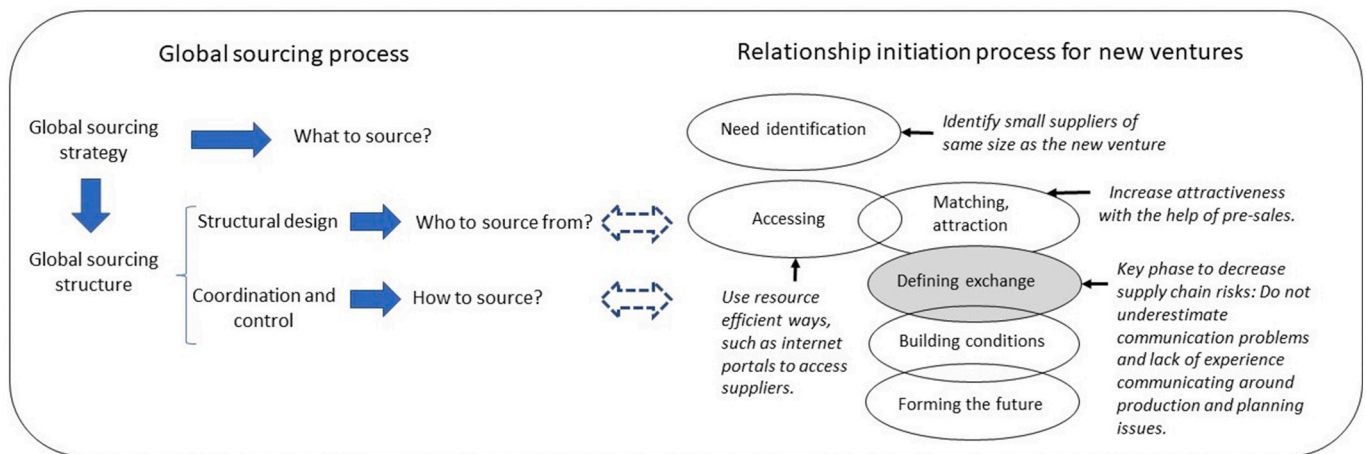


Fig. 2. New ventures’ relationship initiation process for global sourcing

relationship when the start-ups began to interact and negotiate with selected suppliers about the content and type of their relationship (Aaboen and Aarikka-Stenroos, 2017) – this is where any major problems become visible. This can be illustrated by Magtech, whose contract manufacturer quadrupled its production prices almost overnight, eventually halting their trust-based collaboration. Furthermore, Camtech experienced such difficulties communicating and negotiating with its selected Chinese contract manufacturer that it decided to stop collaboration after receiving the first pre-commercial delivery. Thus, our findings suggest that one challenge start-ups face is maintaining attractiveness to keep suppliers from losing interest as the relationship develops from the initial stages to the sub-process of defining exchange. This is new knowledge compared to the earlier literature in which attractiveness has been seen as most important in the sub-processes matching, attracting and accessing.

Proposition 3. For a start-up it is equally important to maintain attractiveness during the defining exchange sub-process as during the matching, attracting and accessing subprocesses.

In Fig. 2 below, we have summarized the propositions and updated the relationship initiation process for the global sourcing of new ventures. Compared to the analytical framework presented in Fig. 1, the sub-processes of matching and attraction have in Fig. 2 changed places with the sub-process accessing. This is because our findings indicate that for a new venture to start a relationship with a supplier, it must first access a supplier before it can match and attract.

7. Conclusion

We have investigated how new ventures develop their first supply chains using a multiple case study of six Norwegian hardware start-ups and a framework that connects global sourcing, relationship development and attractiveness. Our study increases the understanding of new ventures’ global sourcing processes, which is an underexplored topic. Our findings show some central challenges that start-ups face and indicate potential strategies to overcome these.

One limitation of the study is its geographical context. Although the forces driving the new ventures’ supply chain development are global (e.g. pre-sales, web portals such as Alibaba.com and manufacturing in China), there may be specific conditions that are distinct to Norway. Norway has a highly internationally oriented business sector but a relatively small population (5.5 million) and a limited industrial history. Thus, there are potentially fewer domestic suppliers and less sourcing experience available in general, which might make Norwegian start-ups more likely than new ventures in other countries to try to develop a global supply chain by themselves. Therefore, similar studies in other

countries and contexts are welcome, especially since there is very little research conducted on new ventures and supply chain development. Additionally, all the case companies are technology-based producers, which may have implications for the availability of soft funding and pre-sales. Alternative research designs, such as data from other perspectives than the start-ups and longitudinal data, are needed to gain deeper understanding of start-ups’ global sourcing processes.

7.1. Agenda for further research based on the propositions

This study is one of very few focusing on new ventures’ sourcing decisions – we believe there are several research possibilities within this domain. The new ventures in our study tended to use less sophisticated methods for identifying and screening suppliers compared to established firms. This is in line with Ellegaard (2006), who also highlighted instinct and intuition in a research agenda for small firm purchasing. However, while most of the small firms in Ellegaard’s (2006) paper tended to use domestic suppliers, the start-ups in our paper engage in global sourcing by approaching potential suppliers they found on the internet. This brings us to the first point of the agenda: *Explore resource-efficient ways to identify, evaluate and qualify potential suppliers in new channels such as Alibaba.com and on the internet.* This research may benefit from building upon systems developed by established companies for screening and processing large amounts of information about potential suppliers (e.g. Dickson, 1966; Ho et al., 2010); however, it needs to consider that the needs and conditions, and thereby the selection criteria, are different for a start-up.

The remaining agenda for further research use Proposition 3 as a starting point since defining exchange is identified as key in whether the relationship becomes successful or not. As mentioned in Propositions 1 and 2, start-ups lack control and coordination due to difficulties being regarded as preferred or attractive customers (see Schiele et al., 2012). La Rocca and Snehota (2020) found that start-ups’ attractiveness among suppliers is based on different factors compared to established firms. The authors mention, for instance, the potential for co-development and exploitation of resources together with the start-up when doing business with other customers as an important factor for suppliers. In contrast, our study pointed toward the pre-sales enabled by crowdfunding opportunities as a factor that seemed to increase attractiveness. The second point on the research agenda is as follows: *Explore how a start-up may manage its attractiveness before and during interactions and negotiations with potential suppliers.* As mentioned in Proposition 2, start-ups benefit from short supply chains consisting of suppliers who are small firms in order to be able to fulfil their own goals of quality, price and product delivery. Furthermore, as illustrated in Fig. 2, the structural design of the supply chain is interrelated with the relationship development between

the start-up and the suppliers. The third point on the research agenda is as follows: *Explore how start-ups may develop their supplier relationships in order to achieve short, well-functioning supply chains with limited resources.*

Finally, our study also has implications for managers. First, for new ventures to succeed in setting up their first supply chain, start-ups should aim to design a short supply chain consisting of small suppliers with a limited number of system-integrators. They should also utilize the attractiveness that comes with pre-sales to gain the attention and interest of relevant suppliers. Managers should be aware that it is in the interactions and negotiations with suppliers that the potential suppliers' true interest, ability and trustworthiness are revealed. The implications for practice thereby include emphasize developing a business relationship with the supplier in parallel with making sourcing decisions.

Author statement

This academic paper, entitled 'Low power, high ambitions: New ventures developing their first supply chains', is the result of an equally share of work and responsibility of the three authors.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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