INNOVATION, COOPERATION, INTEGRATION: ANALYSIS OF THE SUCCESS AND FAILURE FACTORS OF A PLATFORM-BASED INNOVATION PROJECT THROUGH A COOPERATION FOCUSED FRAMEWORK

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Marking the end of my TU Delft experience is the finalization of this thesis. There have been times of hardships and happiness, although thankfully more of the latter. While I am happy that the process of writing this thesis is finally coming to an end, it has been an enjoyable adventure. I have made memories during my stay in the Netherlands that I will cherish until the end of my existence. I am satisfied with the work I have produced and hopefully others will see it the same way.

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Thank you all, I hope I have made you proud.
EXECUTIVE SUMMARY

Innovation has become an important facet in advancing technology and society as a whole. Numerous private and public players engage in innovative endeavours to capture the myriads of benefits they can create. The road towards successful realization is not free from challenges which has caught the attention of academics. A considerable body of literature has emerged the past two decades. Scholars have attempted to identify the success and failure factors of innovative endeavours, to gain an insight into why they might fail or succeed. A frequently cited factor is cooperation between stakeholders. Cooperation is often determined a vital factor for success and a lack of it can result in project failure. Despite overcoming the challenges of cooperation, the innovation’s feasibility must be assessed. Doing so can help to identify the numerous factors that can aid or hinder the project’s realization. A review of the contemporary literature has highlighted a gap of knowledge in innovation studies. Despite academics in innovations literature often agreeing that cooperation is a very important factor, the challenges of cooperation are hardly ever made explicit. This gap in the literature is one this thesis attempted to bridge. To do so, a framework is formulated which incorporates literature aimed at identifying challenges in cooperation and innovation analysis. This has the goal of identifying success and failure factors of innovative endeavours. Therefore, the research question: “What are the success and failure factors of a cooperative innovation project, identified with the aid of a framework, incorporating cooperative aspects” is presented.

To assess the framework, an innovation project conducted by Transvectio is used as a case. Transvectio is a freight transportation company, engaged in developing an online booking platform for railway transport. The platform would display all available connections they have to offer, along with additional services such as plug-in, pre- and post-carriage, customs assistance and more. They intend to cooperate with other players in their vicinity, inviting them to join the platform to offer their connections and services. With more than thirty players utilizing the same terminal area, there are several opportunities for cooperation but also grand challenges. Interviews are undertaken with experts in the field of innovation or transportation to gather information and seek consultation on the findings. This is coupled with Transvectio’s representatives, which provided data and feedback in an iterative fashion.

A framework was formulated, coined the Cooperative Innovation Analysis Framework (CIAF). It incorporates theories and frameworks from the literature, aimed at facilitating the partner selection process of a cooperative alliance, gain insight into the relationship dynamics of the alliance, analyse technical, societal and ethical challenges, along with other vital facets that can emerge. Transvectio’s innovation project was applied to the framework to identify its success and failure factors and gain insight into the cooperative challenges they might face. The findings were amended in accordance to Transvectio representative’s iterative feedback and the expert interviews. Three success factors were identified: (S1) The perceived low direct competition between carriers in the terminal area, reducing the risk of clients shifting to competitors via the platform, (S2) The platform could aid in remedying a perceived exposure issue that the terminal area is facing, and (S3) The potential of a large client growth, coming from the Asian (mainly Chinese) market. Subsequent five failure factors were identified: (F1) That the financial feasibility of the project has to be established to ensure the benefits are greater than the costs, (F2) Failing to cooperate with the stakeholders in the area, which severely limits the platform’s
growth and success, (F3) Unwillingness from stakeholders to share the needed data to operate the platform, due to strategic risks or investment costs of manipulating data sets and systems, (F4) Poland becoming the first point of contact with Europe, clutching large volumes of cargo from the terminal area, and (F5) Lack of urgency, resulting in previously established pilots and platforms performing similar functions taking flight, surpassing Transvectio’s project. This could result in potential sunk costs.

Finally, the key decisions that need to be made before initiating the project. In short, they relate to (D1) If Transvectio will be a neutral platform operator or not, (D2) If stakeholders are charged commission fees, (D3) Where liability lies in case of accidents, (D4) What data is needed from cooperating stakeholders, (D5) The amount of resources Transvectio is willing to allocate for the project, (D6) The speed of development.

The thesis conclusion evaluates the work performed in the thesis and surveys if the research question has been answered. With the research question being more akin to a process, rather than a closed question, the efficacy of the framework can be debated. The analysis performed could provide Transvectio an aid with their project, by identifying the aforementioned success and failure factors, coupled with the key decisions needed. However, if the project progresses, an evaluation needs to be performed ex-post. Doing so could help assess if the framework managed to capture the key SFFs or not. The CIAF is intended to be general enough to be applied to other projects. The CIAF could assist future innovative efforts, relying on cooperation to succeed, to identify the multitudes of issues that can accompany delicate innovative endeavours. Nonetheless, additional assessment cases are needed before this can be confirmed. To assist Transvectio in making the first move towards realization, their suggested next steps are presented, along with recommendations for future research. The author suggests the further exploration of the relationship dynamics between cooperating stakeholders, and the challenges associated with cooperating with a non-neutral party, where Transvectio operates as a freight transporter, terminal operator, and now exploring platform operations. Finally, the author calls for increased focus on the lack of cooperation in innovation analysis. Attempting to close the aforementioned knowledge gap requires more than this piece of literature.

Note to protect the identity of the entity engaging the innovation project, a pseudonym is used. Additionally, sensitive data and other identifiable factors have been changed or anonymized, respectively.
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ACRONYMS

SFF - Success and failure factor
CIAF - the Cooperative Innovation Analysis Framework
JV - Joint venture
SET - Social Exchange Theory
1 INTRODUCTION

1.1 PROBLEM STATEMENT

In an ever interconnected world, connectivity and networking through digital solutions become more frequent. Numerous opportunities to innovate can be identified alongside this growth. Some of the most successful ones are platform based, facilitating social networking, home delivery, and multitudes of other services. These solutions have also caught the attention of players in the freight industry, with perhaps the latest endeavour being pursued by Transvectio. They are a freight transportation company, which operate a railway terminal in Europe. They are engaging in an innovative project, aimed at developing a booking platform which allows clients to book rail freight transportation, request pre- and post carriage, plug-in, customs assistance and other additional services. The platform also provides management for documents and more importantly conveys all the necessary information in one place. To facilitate the platform’s growth and success, it requires cooperation with the carriers, the terminal hub operator and other stakeholders in the area. The project entails the incorporation of already existing technology, used in a new environment, in a new and innovative way. In order to be successful, a plethora of success and failure factors (SFFs), such as technical, legal, ethical and societal, have to be identified and dealt with. SFFs are those that either provide an opportunity or edge, or can impede the process of the project potentially resulting in its termination, respectively. This has often been the subject in the discipline of innovation studies. Substantial literature has emerged the past two decades that attempts to identify the factors that lead to success or failures of innovative efforts (Van der Panne et al., 2003). Analysing these factors can prove advantageous to break barriers that hamper a successful realization or identify opportunities that aid success. Scholars have attempted to identify the SFFs of private and public projects (Van Wee, 2003; Van den Bergh et al., 2007; De Jong et al., 2013), such as by creating frameworks to aid with the analysis (Feitelson and Salomon, 2004; Hekkert et al., 2007; Geels, 2002). However, despite willingness by stakeholders to realize inventions, they often fail due to numerous factors. Attempts to generalize these factors have been undertaken. Van der Panne et al. (2003) conducted a literature review of 43 innovations in an attempt to discover recurrent factors regarding successful or unsuccessful realizations. Despite some studies finding certain factors being vital for success, other studies claim that a very different set of factors are crucial, while ignoring the previous. The large body of innovation literature shows that the evaluated projects have high heterogeneity, with components and considerations that have to be appraised each time. This results in academics using a mixture of methods, frameworks or focusing on a particular sector.

A factor that scholars often cite as being important is cooperation between stakeholders. It is frequently addressed as a vital factor for project success in the literature (Bontekoning and Priemus, 2010; Van der Panne et al., 2003). Alternatively, lack of cooperation can inhibit project success (Arvidsson and Browne, 2013) and should be undertaken early in the project (Arduino et al., 2013). The importance of cooperation between stakeholders is well grounded in the literature. Academics have developed theories to explain why stakeholders would cooperate and how they might behave when doing so. According to Williamson’s (1985) transaction
cost economics (TCE) theory, firms engage in cooperation to minimize transaction costs. Although, they should avoid doing so if possible due to unavoidable opportunistic behaviour by the competing firms. This view has received criticism, with Nooteboom (1999) developing the dynamic TCE theory. He argues that cooperation is useful for innovations. This is coupled with Noteboom’s contradicting view on trust, compared to Williamson’s, where alliances are not by default cynical. Trust has to be evaluated throughout the process between the collaborating parties. Furthermore, Bengtsson et al., (2003; p. 5) put forward the proposition that “The decision to cooperate or compete with a competitor is depending on the lack of or access to unique capabilities and/or resources”. However lack of trust, fairness, power imbalances and other aspects can hamper cooperative efforts between stakeholders. Scholars have acknowledged the importance of cooperation in innovations and have developed theories to gain insight into the dynamics of cooperative relationships. Nonetheless, no attempts have been made to bridge the two, in order to identify cooperative challenges in innovation. Doing so could reduce the risk of innovative efforts failing due to cooperative challenges. This leads to the identified knowledge gap, presented in the next section.

1.2 KNOWLEDGE GAP & RESEARCH QUESTION

The literature suggests that there is a consensus on the importance of stakeholders and their cooperation (see the Literature Review section for an assessment). Cooperation is a vital factor that often leads to project success, when properly engaged, or can lead to failure when disregarded. However, little attempt has been made to identify the challenges that can emerge from cooperation. Identifying them early in the process could aid the realization of innovative efforts. This presents an unexplored territory in the academic literature. A framework can prove beneficial to link the two disciplines. First, it could incorporate cooperation theory, in order to identify cooperative challenges and gain an insight into the relationship dynamic. Second, it could incorporate several innovation SFF analysis frameworks. This is relevant due to the current frameworks available in the literature being focused on a limited set of characteristics to identify SFFs. This can be exemplified by Feitelson and Salomon’s (2004) political economy model, which aims to recognize the right political climate for new innovations to emerge. As well as Geels’s (2002) dynamic multi-level perspective. It attempts to conceptualize and discover when niche technical developments emerge through changing socio-technical regimes and slow landscape developments. By combining several frameworks, focusing on multiple aspects and disciplines, augmented by incorporating cooperation theory, a generalized framework could be formulated. It could be able to identify SFFs and cooperative challenges of projects where stakeholder relations are vital. To the best of the author’s knowledge, no research has been conducted to create such a framework. Furthermore, Transvectio’s innovation project can be used as a case to assess the framework. The project relies on cooperation between stakeholders to succeed and could benefit from a SFF analysis. By attempting to identify the cooperative challenges and the stakeholder relations that can emerge, it allows for both an assessment of the framework’s efficacy and can provide Transvectio a useful analysis. This knowledge gap in the literature, leads to the formulation of a research question.

What are the success and failure factors of a cooperative innovation project, identified with the aid of a framework, incorporating cooperative aspects

In order to answer the main research question, sub-questions are formulated.
(a) What are the frameworks and theories that can be used to formulate a cooperation-focused framework, that identifies the success and failure factors and cooperative challenges of a cooperative innovation project?

(b) What are the key success and failure factors for Transvectio’s booking platform project?

(c) How can the findings be used to aid future projects to analyse the success and failure factors in similar projects?

1.3 RESEARCH STRATEGY

A short summary of the research strategy is set forth below. A detailed description of the strategy and approach is presented in the Methods chapter.

The research entails the formulation of a framework which identifies the cooperative challenges and SFFs of innovative efforts that rely on cooperation for success. To evaluate the efficacy of the framework, Transvectio’s case will be applied to it. The analysis concludes with the identification of key SFFs and the potential cooperative challenges.

The research approach will be conducted in three main steps. First, the frameworks, theories and methods used to formulate the framework are outlined and explained, detailing the construction and presenting the final framework. Second, Transvectio’s innovative endeavour is outlined and relevant data is presented. The key SFFs of Transvectio’s project are then identified using the framework and presented. Third, for data gathering and evaluation of the identified factors, feedback is provided from Transvectio’s representatives in an iterative fashion. The same is performed through interviews with experts in the industry of rail transportation or innovation. The interviews can provide new insights on the identified SFFs, possibly producing new SFFs or amending others. This is performed until saturation of new information is reached. Finally, the findings are concluded and presented. The findings could aid future innovative efforts to analyse their SFFs, and produce a thesis for Transvectio that aids them in realizing their project.

1.3.1 Link To Study Programme

The researcher is a CoSEM Transport & Logistics student, set on the goal of designing or intervening in a system, using the CoSEM toolbox, in order to solve a problem with clear technical, design and engineering issues. This involves aspects such as stakeholder management, system engineering and creative strategies. The system engineering aspect is reflected in my study through the intervention needed into the system, exploring it from a scientific standpoint and aiding the realization of this innovative effort. The intervention makes use of creative strategies in the form of the framework. Incorrectly identifying and managing the stakeholders can be detrimental to the project. Utilization of the right stakeholder management strategies, systems analysis and creative strategies combines techniques and methods, that have been taught in classes during the master program and adopted during the author’s studies, to produce a thorough and insightful analysis.

1.3.2 Societal Contributions

Realizing this innovative project can have beneficial effects for clients and consumers. With an increased service level and endpoint availability of railway transport, clients could see this mode as more appealing than other more polluting modes, such as trucking. There is increased pressure on countries, companies and
consumers to reduce their carbon footprint. Numerous companies operating in freight transport have set environmental goals they aspire to reach. Furthermore, the increased usage of railway can result in benefits such as more effective transportation and lower transportation costs. In turn, respectively, these benefits can directly relate to a reduction in the carbon footprint of transport and costs of goods for the general public. While these tangible effects might be small-scale, they can become significant if the platform manages to reach a wide penetration.

1.3.3 Thesis structure

This thesis is structured as follows. First, a method chapter is presented, detailing the conducted literature review and the research approach. Second, the formulation of the framework is put forth, starting with a summary of the literature used, concluding with a presentation of the framework and a discussion. Third, a more detailed explanation of Transvectio’s innovative project and the associated data is presented. Fourth, Transvectio’s case is applied to the framework, concluding with a summary of the key SFFs. Fifth, the conducted interviews are put forward. Finally, the thesis concludes with a discussion, suggestions for Transvectio’s next steps and recommendations for future research.
2 METHODS

This chapter presents the literature review, used to formulate the knowledge gap, and the chosen research approach, aimed at answering the sub-questions and ultimately the main research question.

2.1 LITERATURE REVIEW

This section shows the process of the literature selection used to formulate the knowledge gap, previously presented in section 1.2. First, the search strategy for identifying literature is presented. Then the exclusion criteria for the selection of literature is detailed and visualized with a Prisma flow diagram. The selected literature is presented in an overview table and the contents and findings of the papers are discussed.

2.1.1 Literature selection

Search strategy

An abundance of literature is available on innovations, identifying SFFs, with both ex-ante and ex-post evaluations, using multiple analysis techniques such as frameworks and Multi-Criteria Decision-Making methods (Van den Bergh et al., 2007; Ghaffari et al., 2017). To scour the available literature, keywords were formulated from the problem statement. The keywords were the following: “innovation”, “success and failure factors”, “cooperation”, “freight transport” and “railway”. The inclusion of the last two keywords was to narrow the search due to the large amount of literature. The choice was made to cater to the specific sector of the application case. Using the keywords, the following search string was crafted:

innovation AND (“success and failure factors” OR “success and failure” OR “SFF”) AND (“freight transport” AND railway) AND (cooperation OR collaboration)

Exclusion criteria

The literature databases, Scopus, Research Gate and Google Scholar were used to conduct the search. To exhaust the search, title, abstract, keywords and text were searched for a match. Snowballing, when promising literature is identified through the citations and references of promising papers, proved very useful. Articles behind a paywall or those who were not immediately available were excluded. Only articles, journals, papers and literature reviews in English were considered. Innovation literature, identifying SFFs with the aid of frameworks and other techniques, has mostly emerged the past two decades. Therefore, due to the profusion of search results, literature before 2000 was excluded in the search. Note that if certain literature were considered to be a corner-stone or very prominent, it was included, despite falling under the exclusion criteria. Also if identified with methods such as snowballing. A Prisma flow diagram is presented in Figure 2.1, to visualize the assessment process and literature exclusion criteria (Moher et al., 2009).
A literature overview table is visualized in Table 2.2. It presents in a structured way how the selected literature conducted their research and their relevant contents. From the plethora of available innovation literature, 15 papers have been selected and reviewed based on four aspects: The analysis techniques used to identify SFFs, the field of study, if the importance of stakeholders has been addressed and finally the emphasis on cooperation or collaboration between stakeholders. The main focus when reviewing the literature was on the salience of these aspects. Finally, due to the inclusion of the keywords “freight transport” and “railway”, most cases from the search results focused on that sector. Although, innovations in other fields were added through snowballing to compensate this shortcoming. Other fields included construction (Widén et al., 2014; Faried and Saad, 2017), ICT (Idota et al., 2010) and maritime innovations (Ballis and Stathopoulos, 2003; Arduino et al., 2013).

As the literature overview table visualizes, numerous analysis techniques are used to identify SFFs. Subject to the heterogeneity of innovation projects, the identified techniques produce both argumentative quantitative and qualitative results. Although, there seems to be no consensus in the literature which technique is superior.
From the reviewed literature, eight addressed the salience of stakeholders, how important to the project the inclusion and focus towards stakeholders were. Despite varying focus on stakeholders in the innovation process, the involvement of stakeholders was: Considered an important factor (Bontekoning and Priemus, 2010; Visser et al., 2008; Arduino et al., 2013; Mueller and Blanquart, 2014; Wiegmanns et al., 2007), used as an evaluation factor of a successful innovation (Van den Bergh et al., 2007), and determined a barrier due to conflicting objectives (Arvidsson and Browne, 2013). Widén et al. (2014) conducted an empirical research to study the link between successful innovation diffusion and key stakeholder engagement. Their results show a significant correlation between the two and recommend stakeholder inclusion early on in the innovation process.

### 2.2.2 Emphasis on cooperation

Cooperation or collaboration between stakeholders was prominent in several papers. It was determined a success factor or a very important factor for project success (Faried and Saad, 2017; Bontekoning and Priemus, 2010; Idota et al., 2010; Van der Panne et al., 2003; Van den Bergh et al., 2007; Ghaffari et al., 2017), needed to break barriers, inhibiting project success (Arvidsson and Browne, 2013) and that it
can foster innovative efforts (Mueller and Blanquart, 2014). Arduino et al. (2013) determined it a spark for one of their reviewed innovations and that the development phase might be more successful with a wider cooperation among the stakeholders involved. Widén et al. (2014) agree and state that productive change can take place not only with a single stakeholder but with the cooperation of key stakeholders. Papaioannou and Peleka (2006) identified that the Thessaloniki Submerged Arterial (THESUB) project lacked early on the need for strong and continuous collaboration between stakeholders. Visser et al. (2008) reviewed ex-ante the failed Dutch underground freight transport project (OLS-ASH). Conflicting clarification of roles, interest and complexity between the numerous stakeholders, suggesting a lack of cooperation and information flow, was determined to be one of the failure factors of the project. The remainder of the reviewed literature focused on other criteria than cooperation (Wiegmans et al., 2007; Ballis and Stathopoulos, 2003; Bozicnik and Schliephake, 2005).

The findings of the literature review provide assistance in formulating a suitable research approach. With the identified lack of focus on cooperation in innovation literature, it becomes challenging to identify the SFFs of a project that relies heavily on cooperation to realize its full potential. Some of the aforementioned scholars make it explicit that cooperation is very important for project success and a lack of it can inhibit success. If certain innovations rely heavily on cooperation to succeed, they could benefit from a framework that identifies the cooperation related challenges that can emerge. Failing to identify these challenges can be detrimental to project success, as was evident in THESUB and OLS-ASH projects. No suitable frameworks exists in literature, to the best of the authors knowledge, that attempts to do so, presenting an interesting starting point to the research approach.

2.3 RESEARCH STRATEGY & APPROACH

This section lays out how the thesis will attempt to answer the sub-questions, detail the approach to data collection and the steps needed to sufficiently answer the main research question. To refresh the reader’s memory, the respective sub-questions are reiterated in each step. A summary can be found at the end of this section, including a visualization, to present the research approach in layman’s terms.

2.3.1 Step 1: Sub-question (a)

What are the frameworks and theories that can be used to formulate a cooperation-focused framework, that identifies the success and failure factors and cooperative challenges of a cooperative innovation project?

A framework will be formulated, to both identify cooperative challenges and identify the SFFs of innovative projects relying on cooperation. To formulate the framework, theories and frameworks are chosen, suitable to identify and evaluate the SFFs and apprehend stakeholder’s relations and their challenges. Frameworks are available in the literature that combine different disciplines, namely Feitelson and Salomon’s (2004) political economy model, Hekkert et al.’s (2007) functions and Geels’s (2002) dynamic multi-level perspective. Frameworks and theories aimed at facilitating cooperation are threefold as well. First, Alves and Meneses’ (2015: 92) three step model for partner selection in co-opetition, which allows for a “conscious and judicious selection based on specific criteria related to partner’s operational skills, resources, effectiveness and trust”. Second, Social exchange theory is incorporated. It studies the relations and behaviour of actors that are formed by the benefits and
costs they provide in the relationship. Molm’s (1994) theory of dependencies in social exchange can affect the structure of an alliance, its transactions and outcomes. Due to the dependencies formed in an alliance, several elements, vital for successful collaboration and information sharing can affect the relationships. Wu et al. (2014) attempted to capture these elements, through four key social exchange issues: trust, commitment, reciprocity, and power.

2.3.2 Step 2: Sub-question (b)

What are the key success and failure factors for Transvectio’s booking platform project?

With the framework formulated, the following step is identifying the SFFs Transvectio might face when realizing the project, along with cooperative challenges. This is performed through an analysis, using the framework formulated in sub-question (a). To gather data, as well as aiming to discover new perspectives of the identified SFFs, two methods will be used. First, an iterative method in cooperation with Transvectio’s representatives. The researcher formulates a set of SFFs, identified through the framework, presents them to the representatives and conducts informal interviews to get their feedback and counterpoints. They will also be contacted to gather all necessary data for the project. Transvectio’s representatives will be their director of rail and CIO. Second, interviews with experts are undertaken. The parties that will be contacted are academics or professionals with considerable experience in the relevant discipline, such as innovation studies or freight & logistics. They will then be asked to provide suggestions for further interviews with experts in the same field. The interviews will be performed in a semi-structured form, face-to-face, or through a video call if necessary. They will be recorded in order allow for playback to capture all information gathered in the interview. Interviewees will be asked about several aspects. First, the identified SFFs and their views towards the project. Second, any additional SFFs they might have identified themselves and if so, then asked for argumentation. Finally, the level of cooperation needed between the competitors and if cooperation is feasible and desired. The interviews will then be analysed, answers summarized and number of arguments are counted. The interviews will seize once new relevant information has been saturated, and the number of new arguments are low.

2.3.3 Step 3: Sub-question (c)

How can the findings be used to aid future projects to analyse the success and failure factors in similar projects?

The final step interprets the findings of previous sub-questions in an attempt to: (1) Aid future innovative efforts, relying on cooperation, realize their projects. (2) Close the gap of knowledge in the literature. (3) Give Transvectio a well-formulated analysis of the potential SFFs they might encounter, in order to aid them in realizing a successful project and attempting to extract the available potential the project can provide for them and key stakeholders.

2.3.4 Summary

To summarize the research approach for the reader, a short outline of the approach is presented. The first step entails using frameworks from Feitelson and Salomon (2004), Hekkert et al. (2007) and Geels (2002) to formulate the innovation analysis part of the framework. Alves and Meneses’ (2015) three step model is used to select the suitable stakeholders for cooperation. Molm’s (1994) theory is used to analyse
the relationships and interdependence of the competitors, incorporating the key criteria for social exchange issues from Wu et al. (2014): trust, commitment, and power. The third step identifies the SFFs through the framework, formulated in the first step. The factors and information presented is then evaluated through iterative feedback with representatives from Transvectio. Also by conducting interviews with experts in the field of railway transportation or innovation studies. Final SFFs are then formulated and presented. The fourth and final step concludes and interprets the previous findings to aid further innovative projects, attempts to close the knowledge gap in the literature and provide Transvectio a thorough analysis.
This chapter presents and discusses the literature and concepts that form the input for the framework. As mentioned in the Methods chapter, a total of six papers are used to formulate the framework. They are amalgamated to construct the framework and then applied to analyse the SFFs of Transvectio’s project. First, a summary is presented of the theories and frameworks used. Second, the framework is presented. Third, connection between used theories and argumentation for the selection of literature is put forth. Finally, concluding with a discussion regarding the selection of theories, the connection between them, as well as a critical review of the framework, its advantages and disadvantages.

To inform the reader on the theories and frameworks that comprise the framework, each literature is appointed its own section below. Some readers might be familiar with the theories and concepts found in the literature, therefore only a short summary of each literature is introduced, sufficient to grasp the building-blocks and the formulation of the framework. If the reader is unfamiliar with the literature, a more comprehensive presentation of the main concepts and theories is found in Appendix C.

### 3.2 Summary of Theories

To inform the reader on the theories and frameworks that comprise the framework, each literature is appointed its own section below. Some readers might be familiar with the theories and concepts found in the literature, therefore only a short summary of each literature is introduced, sufficient to grasp the building-blocks and the formulation of the framework. If the reader is unfamiliar with the literature, a more comprehensive presentation of the main concepts and theories is found in Appendix C.

#### 3.2.1 Alves & Meneses’ Partner selection process

It is well recognized that firms seek additional resources and knowledge through their business networks once their activities surpass the internal expertise or resources they possess (Tomlinson and Fai, 2013). Reaching these additional resources has been suggested to increase the innovative capacity firms have to offer (Georghiou, 1993). However, cooperating with other firms can create dependence, which risks opportunistic behaviour, reducing the innovative efforts of firms (Williamson, 1985). Therefore, the need for strong and close-knit ties between the cooperating partners is needed to minimize the sub-optimal behaviour, usually achieved through social norms and solid codes of conduct (Tomlinson and Fai, 2013). Solidifying credibility and reputation in the business network is therefore of high importance for continued and effective cooperation with partnering firms and future cooperative efforts.

When engaging in co-opetition, cooperating and competing with firms at the same time, these relations become more complex. These forms of partnerships aim to work together towards a common goal in a certain market domain, by sharing resources and knowledge. Concurrently, they improve their own performances in other domains through independent action (Luo, 2007). A well known example of this strategy is the co-opetition partnership between Sony and Philips, with the
development of the DVD player. They then competed in the sales of DVD discs. In order to manage this paradox of competing and cooperating at the same time, partner selection must be carefully performed.

Choosing the correct partner is of the essence as many incentives are in place for sub-optimal behaviour. The right selection of partners is regularly regarded as a detrimental factor, being one of the most important for a successful business partnership (Geringer, 1991; Shah and Swaminathan, 2008). Alves and Meneses (2015) identify that task-related and partner-related aspects of the partner selection criteria has been grounded by academics, but infer that “It seems that there still remains an absence of an unifying theory capable of explaining partner selection process as a whole in strategic alliances in general and in co-opetition in particular” (p. 96). In order to close this gap of knowledge and attempt to gain and understanding of the selection criteria in the choice of partners, they formulate a partner selection framework. Studying four successful cases of long-lasting partnerships in three industry sectors, their analysis found that prior personal relationships were present in all cases. These prior relationships were often the result of family or friendship ties or previous business associations. Shared business networks were also an important factor, where positive experiences from previous interactions facilitate the spark for partnerships, and highlight the significance of trust when selecting partners. Similarly, shared vision and ease of communication were considered vital facilitators (p. 101). A conceptual framework was then formulated based on the results of the study, seen in Figure 3.1.

Figure 3.1: A three step model for partner selection (taken from Alves and Meneses, 2015)

Once a firm decides cooperation is needed to further their goals, decision-makers set to identify the potential group of viable partners. This is argued to be an unconscious process, forming a group of potential partners, limited by the connection network of the firm. This unconscious bias might exclude viable partners, when information on trust or image is lacking and no ties or relations have been formed.

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1 Complementary products or skills; financial resources; technology capabilities or uniqueness; location; marketing or distribution systems, or established customer base; reputation and image; managerial capabilities; government relationship, including regulatory requirements and government sales; help in faster entry into the target market; and industry attractiveness. (Taken from Das and He (2006) p. 126)

2 Strategic fit or interdependence; or compatible goals; compatible or cooperative culture and ethics; prior ties and successful prior association; trust between top managers; strong commitment; similar status, including size and structure; reciprocal relationship; commensurate risk; and ease of communication. (Taken from Das and He (2006) p. 126).
From this group of potential partners, a careful selection takes place, based on prudent criteria such as strategic fit, access to resources or specific technology, market penetration or risk related criteria. This creates the viable group from which partners are selected (p. 103).

When no systematic and conscious selection of the available partners is accessible, this unconscious bias comes into play, where trust and previous relations are of the essence. However, when dealing with larger firms bolstered by a well-grounded reputation, it could help to remedy the lack of trust when information is missing. However, these findings should not be generalized to all co-opetition partnerships, as the cases were selected on previously established domestic partnerships. The goal is not to come to the conclusion that previous successful cooperation or personal ties is a prerequisite for the establishment of co-opetition partnership, but rather to highlight the unconscious and important biased selection that takes place when selecting partners. Rather suggesting previous positive relations can be vital when selecting from a group of partners that meet other task- or partner-related criteria.

Once viable partners have been identified, the relationship of the potential cooperative alliance can be analysed and evaluated based on the theory of social exchange.

3.2.2 Molm’s Social Exchange Theory

The theory of social exchange places emphasis on actors exchange networks of social relations and their interactions, rather than their attributes or the content of interaction (Molm, 1994). Social exchange theory (SET) studies the relations and behaviour of actors that are formed by the benefits and costs they provide in the relationship (p. 163). In any exchange relationship, actors contain resources (such as financial, information or behaviour based) that are valued by other actors. SET attempts to form predictions on the relations between actors, not individual actor behaviours. Focusing on the dependencies that are formed in these relationships, structuring the flow of costs and benefits through interaction, created by the resources actors value (p. 164).

SET is based on a minimal conception of the actor (p. 164). Only one assumption is made about actors which is that their behaviour will attempt to increase outcomes they value positively and decrease those they value negatively (p. 164). Note that they might still not seek these outcomes in a conscious or rational way or attempt to maximize outcomes. However, they may behave in a rational way, by exploring alternative options of partners and actions and weighing pros and cons, or base their choice on past choices and interactions with partners, without deliberately weighing pros and cons. The theory does not assume what actors value, it can be financial, social or selfless goals. Therefore, the concept of a value is different for each actor. SET therefore attempts to bypass the focus on actors characteristics, assuming that actors behave in similar ways to obtain what they value, whatever it might be.

The dynamics of the relationships between actors regarding the structure of outcomes can be defined as being: (p. 165).

I Independent, where the actors are solely dependent on their own behaviour,

II Dependent, where actors are solely dependent on other actors behaviours,

III Interdependent, where actors are dependent on some combination of their own behaviour and other actors.
When exchanging in a dyadic or network based relationship, the reciprocal dependence can either be direct or indirect. With direct reciprocity, benefits are given and received directly between actors. With indirect reciprocity, benefits are not received directly, but rather indirectly between the actors within the group. When the structure of the relationships is built only on interdependent (mutually dependent) relations, the individual actors do not have control over the outcomes for themselves or others, but rather rely on each other to produce outcomes they normally could not perform alone (p. 166). With explicit reliance on other actors to perform tasks or receive benefits one can normally not achieve alone in a mutually dependent relationship, issues and opportunities for sub-optimal behaviour emerge that actors should be vary about and seek to minimize.

Initiating exchange relationships is inherently risky as non-reciprocity can be utilized by opportunistic actors. Different risks face actors, contingent on the nature of their relations. In dependent relationships, actors rely on others to receive benefits. As such, they can produce value for other actors but receive nothing in return. This incentive not to reciprocate is greater in with indirect exchange, and the risk increases with larger networks (p. 167). However, when actors become interdependent, this risk is reduced since actors’ outcomes are dependent on their own contribution. There is no incentive for non-cooperation. Molm describes this with a fitting example, with the case of two professors co-authoring a book. No incentive exists to take without giving in return, as mutual dependence is in place.

Nevertheless, interdependent relationships are not free from opportunistic behaviour. Free-riding can be conducted, where members receive benefits without supplying anything in return. Despite structures of pure interdependent relationships being easier to establish and maintain, they tend to dilute into less stringent versions of themselves with larger network sizes, where chances of non-optimal behaviour, such as free-riding increases (p. 167). How can actors overcome these risks? Molm raises the same question and argues that the way in which the process of exchange is structured, the relations can be altered to capture the elements of interdependence (p. 167). In direct exchange relations, two forms of transactions are distinguished. Firstly, negotiated transactions, where both sides engage in negotiation to explicitly decide on costs and benefits of the transaction. The relations of outcomes is a joint decision process. Secondly, reciprocal transactions, where actors’ contributions are not negotiated but are performed separately (p. 168). These types of relations are based on trust and develop over time. Actors can offer contributions with future reciprocity left implicit. Although usually, this can create a series of back and forth reciprocation, sequentially contingent but still affected by actors’ separate decisions. As in, the division of outcomes is affected by what actor receives from another and what will be given in return next and so on (p. 169). In economic exchanges, negotiated transactions are unsurprisingly much more common. Both these forms of transactions change the intrinsic risk in mutual dependence relations, albeit in different forms and to a different level. By having actors reach an agreement beforehand or being reliant on reciprocating to receive benefits in return, the structure of the relations is transformed from one of dependence to having elements of interdependence. Negotiations allow actors to explicitly know what they are giving and receiving, avoiding the risk of having the exchange being unilateral (p. 169). However, this does not remove the risk of applying tactics, even unknowingly, that result in less favourable agreements for either party, due to the elements of power and trust.

The elements of power and trust play an important role in finding a balanced relationship. However, Molm only lightly touches on these two elements, which leaves the question if others like them also play an important role and how can they
be captured and explored. Wu et al. attempts to explore these elements and identify the key antecedents for information sharing and collaboration.

3.2.3 Wu’s et al. Key criteria

Wu et al. (2014) argue that competition has shifted towards being between supply chains, rather than organizations. Supply Chain Management (SCM) attempts to help firms manage its partners in an attempt to effectively build long-term partnerships. Wu et al. (2014: p.122) define SCM as: “an effective management on the three complementary flows, material, information, and finance, between a focal firm and its partners”. Due to SCM’s often containing a vast amount of partners, sometimes located all around the world, the mechanism of managing these flows is through online information. The largest issues with this mechanism is information sharing and collaborative effort (p. 122). With regards to information sharing, it can be inconsistent between the partners upstream and downstream, resulting in the need to forecast demands based on fragmented information. This results in partners maintaining a higher stock for their commodity to better respond to market fluctuations, which can lead to the well known “bullwhip effect” (p. 122). Collaborative efforts is a mutual decision-making process which aims at achieving joint goals, allowing partners to mutually gain increased clarity in understanding future demands, responding with a feasible plan in order to satisfy it and coordinate the relevant activities in a structured way.

Social Exchange Theory (SET) argues that behaviours towards exchanging with others are decided by the benefits of interaction subtracted with the cost of that interaction. (To avoid repetition, SET is only lightly touched upon here for context). SET composes several fundamental principles of reinforcements, such as psychological or economical. These principles include trust, commitment, reciprocity, justice, relative dependence and power (p. 123). Numerous studies have utilized SET to explore developments in supply chain relationships. Based on a literature review, Wu et al. choose the following four principals, that act as antecedents to information sharing and collaboration, based on the theoretical foundations of SET: trust, commitment, reciprocity and power. The authors employ a structural equation model, equipped with hypotheses in an attempt to explore the effects the principals have on information sharing and collaboration. Data was collected through a questionnaire with firms qualified by the authors, requiring an emphasis on the investment of supply chain technologies and significant experience in SCM practice. They gathered a sample size of 177. The findings reveal that trust, commitment, reciprocity and power are important antecedents, with significant loadings, but that reciprocity failed to provide sufficient loading on collaboration. The three aforementioned antecedents are therefore selected to the incorporated into the framework.

3.2.4 Feitelson & Salomon’s Political economy model

Feitelson and Salomon’s (2004) paper presents their political economy model of transport innovation adoption. They present their political economy model in Figure 3.2. The model describes the factors and the barriers new ideas must break through before being adopted, and the active agents affecting this process. The model is more applicable to the public sector, rather than the private one. This is due to its focus on the correct political climate and “policy window” for innovations to emerge. It examines a broad range of factors that need to be considered for innovation adoption, namely the technical, societal and economical ones. Taking a private sector view of the “policy window”, it can be seen as being determined not by political but by the societal aspects, such as the public’s perception of problems
and how effectively the proposed innovation addresses these problems. Current sanctioned discourse, morals and ethics also affect this perception.

Figure 3.2: The political economy model of transport innovations (Taken from Meex, 2017)

3.2.5 Hekkert's et al. functions

Hekkert et al. (2007) call for a restructure in the innovation process. They argue that there is a hefty need to influence the speed and direction of innovation and technological change. They look at the innovation process in a holistic sense, where not only a view is taken of the technology itself, but rather its interaction in which the technology is embedded, so called innovation systems. (p. 414). Through assessment of literature and several empirical studies, the authors propose a set of functions. They are to be utilized when mapping key activities in the innovation systems and to explain shifts that could occur. The authors propose the following functions. They also suggest which activities should be mapped and how.

Function 1: Entrepreneurial activities

Entrepreneurial activities are crucial for a well performing innovation system. They can either be incumbent actors or new entrants and their role is to utilize new technology, knowledge and markets and business opportunities. The entrepreneurs experiments with treading new grounds entails substantial risk and high uncertainties, but is necessary to gain new knowledge. A well functioning innovation system likely fosters entrepreneurial activities. When lack of entrepreneurial activities are noticed, it can be the cause of deficiencies in other functions. While the entrepreneur might think these deficiencies are external and fixed, this is not the case. Although, he or she should consider how much effort and resources should be put into adjusting and influencing the system versus the in-firm processes and development. Hekkert et al. present Van De Ven’s 1993 formulation of three questions that need to be answered from the viewpoint of the individual entrepreneurial firm: 1) which
functions will the entrepreneur perform?, 2) which organizations should the firm link to, in order to perform other functions?, and 3) which organizations will the firm compete with on certain functions? (p. 422). The authors suggest analysis of this function through the mapping of: “the number of new entrants, the number of diversification activities of incumbent actors, and the number of experiments with the new technology” (p. 422).

Function 2: Knowledge development

The processes of learning are vital to the innovation process. Research and knowledge development is a precondition within the innovation system, where learning by searching and learning by doing are key. The typical indexes for the mapping of this function over time are: 1) R&D projects of the innovation, 2) patents, and 3) investments in the innovation R&D. (p. 422).

Function 3: Knowledge diffusion through networks

The main function of networks is the exchange of information. Policy decisions, with regards to standards and long term targets, should be in line with current technology as well as being effected by changing norms and values. Through the use of networks, “learning by doing” and “learning by using” provides valuable benefits. To analyse this function, one can map the number of workshops and conferences devoted to a specific technology topic, and the network size and intensity over time. (p. 423).

Function 4: Guidance of the search

This function relates to the process of selection. Resources are most often limited, so when the choice between numerous technological options are presented, it is vital that a specific focus is chosen. Relating to functions 2 and 3, the process of learning is not autonomous. Choosing a specific direction of technological change, taking into account changing preferences in society and targeting activities that can positively affect the visibility and clarity of specific wants among the users. Public activities can provide legitimacy and influence the direction of technological change through environmental goals, such as an increased share of renewable energy or reduction in emission. Such long term policies provide a feasible target that reduce the uncertainty resource spending. However, this is not only a matter of public or private influences. It is also the interactive and cumulative process of information exchange by actors in the network. Actors are often solely driven by a hunch. Through experiments (function 1) and knowledge development (function 2), the achievements and shortcomings can be liaised to other actors in the network (function 3), reducing the perceived uncertainty. Success stories can also generate momentum for change in a certain direction. The function can be analysed by ”mapping specific targets set by governments or industries regarding the use of a specific technology and by mapping the number of articles in professional journals that raise expectations about new technological developments. By counting the number of articles that are positive or negative regarding the new technology development, the state of the debate can be assessed. A strong discussion about the potential benefits of new technology is likely to hamper future developments, while a strong emphasis on the positive aspects is likely to stimulate technology development (p. 424).

Function 5: Market formation

When new technology enters the market, it often faces difficulties competing with existing ones. Hekkert et al. state that new technology is out of necessity relatively
crude and inefficient, relative to its ultimate use. Compared to previously embedded technology, the advantages it provides may be small or even none. Given these circumstances, the diffusion will naturally be slow. Creating a protected space for new technology, such as through (possibly temporary) niche markets, can allow actors to learn about the new technology (function 2 and 3) and develop expectations (function 4). Public endeavours can also provide this protection through competitive advantages, such as subsidiaries, favourable tax regimes or minimal consumption quotes. This function can be analysed by mapping the number of niche markets that have been introduced, specific competitive advantages for new technologies, and new environmental standards that improve the chances for new environmental technologies. (p. 424).

Function 6: Resource mobilization

Sufficient resources and its mobilization are the basis for knowledge production and other activities in the innovation system. Funds towards long term R&D projects by public or private actors, as well as for experimenting and testing new technology are among the activities for this function. Without sufficient resources, other functions become almost impossible to be undertaken. This function is difficult to map. The authors recommend gaining insight into the perception of core actors, through interviews, if they deem access to sufficient resources being problematic or not (p. 424).

Function 7: Creation of legitimacy/counteract resistance to change

The resistance to change will always be apparent when introducing new technology, specially from parties holding interest in the incumbent technology, opposing this "creative destruction". Advocacy coalitions can be the motor for change; "they put a new technology on the agenda (function 4), lobby for resources (function 6) and favorable tax regimes (function 5), and by doing so create legitimacy for a new technological trajectory" (p. 425). Their success is directly dependent on the resources available (function 6) and the social expectations (function 4) that are coupled with the new technology. This function can be analysed by mapping the rise and growth of interest groups and their lobby actions.

3.2.6 Geels’ Dynamic multi-level perspective

Geels (2002) addresses the question of how Technological Transitions (TT) occur. TT is defined by Geels as "major technological transformations in the way societal functions such as transportation, communication, housing, feeding, are fulfilled" (p. 1257). Geels formulates a dynamic multi-level perspective to analyse TT. Similar to Hekkert et al., he looks at the technological transformations in a holistic way. TT not only implies technological changes, but also the socio-technical aspects of the system, such as laws and regulation, networks, infrastructure, user practices and symbolic meaning of technology. Both Hekkert et al. (2007) and Geels agree that niche or radically new technologies have difficulties emerging into the current system due to users, networks, infrastructure, laws and regulations being aligned to the currently used technology, creating a lock-in effect. Therefore, Geels explores if there are specific patterns and mechanisms in the TT. To do so, he adopts an approach that stems from the sociology of technology, meaning that technology is essentially useless and without a purpose unless "in association with human agency, social structure and organisations does technology fulfil functions" (p. 1257). All the elements that fulfil social functions are bound together through their elements, where artefacts, skills and technology and embedded in their socio-technical systems.
Geels uses the notion of “regimes” to describe the stability of different linkages between heterogeneous elements. “The elements and the linkages are the result of activities of social groups which (re)produce them.” (p. 1259). These groups are aligned with one another and co-ordinated. Geels uses the example:

“Road infrastructures and car regulations, for instance, are built and maintained by transportation ministries. Cultural and symbolic meanings of cars are produced in the interaction between users, media and societal groups. User practices and mobility patterns emerge from the daily use of cars by user groups. Industry structures are the outcome of mutual positioning and strategies of car manufacturers and their suppliers. The technological knowledge embodied in cars is created by car designers and engineers, while cars as artefacts are produced by car manufacturing firms.” (p. 1259).

This co-ordination between the different groups forms the technological regime, which results in technological trajectories, due to the community of actors searching in the same direction. This concept is then expanded to introduce socio-technical regimes, which is coupled with the technological regime. It describes the semi-coherent ruleset carried by different social groups within the multi-actor network. The socio-technical regime includes the practices, knowledge, governance structures, product characteristics, morals and norms that can dictate the trajectory of technological change (p. 1260). Geels presents his finalized dynamic multi-level hierarchical perspective on TT in Figure 3.3.

![Figure 3.3: The dynamic multi-level perspective on Technological Transitions (Taken from Geels, 2002)](image)

The socio-technical regime is broken up into seven dimensions: technology, user practices and application domains (markets), symbolic meaning of technology, infrastructure, industry structure, policy and techno-scientific knowledge. The arrows flowing from these dimensions represent the incremental ongoing processes (represented with long arrows). Each dimension has internal dynamics as well as acting externally on other dimensions, leading to tensions and conflicting opinions and uncertainty. This is represented with changing trajectories of the arrows and the smaller diverging arrows. Overarching the regime are the socio-technical landscapes. It is the material context and rigidity of societal constructs, such as material and spatial arrangement of a city, infrastructure, factories and highways. Contrary
to the socio-technical regimes, which refer to the rules that inhibit or enable activities, the landscape refers to a set of heterogeneous elements that are external to the interactions of the actors in the system. These external factors include oil prices, environmental problems, wars, economic growth, cultural and normative values (p. 1260). Landscapes change, but much slower than regimes. The landscape level is depicted with large slow-moving arrows, which represent its dynamics. Changes and evolution occurs slowly, such as cultural changes, norms, large political changes and demographic trends (p. 1262). The niche level is more chaotic, as a dominant design has not yet been fully formed. The niches are vital for TT as they provide the "seed for change" (p. 1261). The regimes create innovations in incremental steps while radical innovations are produced in niches. The niches are protected from the regular regime markets, which they need, as they normally emerge as crude and inefficient innovations, having low performance and high expenses. The niches allow for opportunities for learning processes, such as learning by doing, interacting and using.

3.3 PRESENTATION OF THE FRAMEWORK

The following section presents the framework. Due to its focus on cooperation and holistic innovation analysis, it is coined: The Cooperative Innovation Analysis Framework (CIAF). It utilizes the theories and frameworks previously described. This framework is specifically focused on innovation endeavours that intend to engage in cooperation with one or multiple partners. It is best suited to analyse innovative endeavours conducted in the private sector. This is due to less focus being put on public sector aspects, such as a suitable political climate and ideal policy windows for innovations to emerge. The framework is first visualized in Figure 3.4 and then a discussion is undertaken to explain its mechanisms.
To aid the reader’s comprehension of the framework, a description of the building-blocks is presented. The framework aims to facilitate innovative efforts where cooperation is an integral part. Cooperation entails the inclusion of viable stakeholders. The amount of stakeholders and the difficulty of making a suitable choice of can often be overwhelming, therefore a selection has to be made to produce a viable
pool of stakeholders. The viable pool of stakeholders are those that could be considered as cooperative partners. This is to perform an assessment of the suitability of partners, from the perspective of the one who seeks cooperation. In order to do so, the process of partner selection is applied. Social relations criteria is then applied to the viable pool of stakeholders to explore the alliance’s possible social relations and interactions. The components (green and orange boxes) make up the partner selection and social relations criteria. The viable pool should be considered once moving to the next stage of the framework, the innovation analysis (red colored components). This is due to the potential influence certain stakeholders can have on the innovation analysis and vice versa. The innovation analysis consist of eight facets. All the facets are interrelated, meaning that they can affect each other and overlap. The landscape developments encircle all the other facets to illustrate the overarching effect they can have. The heart of the innovation analysis is the symbolic meaning of technology and ethical concerns. It is strategically placed in this illustration in an attempt to make the analyst reflect on the ethical and moral ramifications that innovations can carry. Once completing the framework, the analyst is presented with viable partners for cooperation, along with the expected dynamic of the cooperative alliance, coupled with a holistic analysis of the innovative endeavour and identification of SFFs.

The components and facets that make up the framework are extracted from the theories. They consist of series of questions and queries that allow the researcher, performing the analysis, to examine the multitude of issues, challenges and hurdles that can emerge during the innovation’s development and adoption. To make it explicit, what has been extracted from which literature to formulate the questionnaire, table A1 is presented in the Appendix. Keep in mind that this questionnaire is not an exhaustive check-list to tick off. It is rather to make the firm/entrepreneur take a step back to explore the dynamics and functions of both potential cooperative relationships, as well as innovation development and adoption. As can be noticed, several elements of the theories and frameworks overlap. This is to be expected, since certain prerequisites can be vital factors for the development and adoption of innovations. This is shown for example with the focus on technology/technical requirements in Geels (2002) and Feitelson and Salomon (2004), the Application domain/markets/Market formation in Geels (2002) and Hekkert et al. (2007). Also where Molm (1994) and Feitelson and Salomon (2004) focus on the perceived distribution of benefits and costs. For this reason, theories and frameworks are combined or linked together to form the CIAF. This is also done to refrain from cluttering the framework, reducing repeated information and harmonizing the puzzle pieces of the frameworks.

Note that to address the entity conducting the analysis, the word “analyst” or “firm” is used.

3.3.2 Cooperation Segment

For clarity, the framework is segmented into two parts. The first segment presents the questionnaires that form the buildings blocks of the cooperation segment.

Partner Selection

The selection of the right partner when forming cooperative alliances is vital as an inadequate selection can have dire consequences. Whether the decision is to cooperate with a singular partner, or choosing from several candidates, the entrepreneur/firm engaging in cooperation should ask themselves the following questions.

• Are there any previous (personal or business related) relationships with other stakeholders?
• How is the current relationship with stakeholders?
• Can each party contribute something of value to the partnership?
• Is each party free to negotiate the terms and conditions for the cooperative agreement?
• Can all parties find a positive balance between the pros and cons of the relationship?
• Do all parties have a shared vision of goals and is their interpretation and perception of the market aligned?

According to their research Alves and Meneses (2015) find that prior personal or business related ties are an effective way to form cooperation alliances when engaging in coopetition, although it is certainly not a prerequisite. Previous positive ties should not be a deciding factor for the selection of partners and it is therefore important to keep this bias in mind. Despite their focus being on alliances engaging in coopetition, alliances that do not engage in coopetition but rather “regular” cooperation should also perform this analysis. Exploring the nature of the relationship, the distribution of benefits, power levels and visions of parties involved, has significant merits to ensure the relationship will be healthy and balanced. This questionnaire should serve as an instrument to provide the analyst an abstract idea of the viable partner pool.

The freedom to negotiate the terms and conditions is a vital factor to ensure rights and benefits are distributed fairly. Also to protect actors if power imbalances are perceived. Although, situations do occur where decision makers have to choose the least bad option, or simply engage in sub-par alliances. Engaging in this type of introspection reduces the likelihood of discovering later that the firm/entrepreneur has been locked in such an alliance. However, there is a need to explore the dynamics and form predictions on the relations between partners. This is what Social Exchange Theory (SET) attempts to do. The CIAF regards the partner selection process as a way of creating a viable pool of potential partners, then using SET to dive deeper, forming predictions on expected behaviours of the viable partners.

**Alliances’ Social Relations & Interactions**

To perform this lower level analysis, the viable pool of partners should be evaluated based on the following criteria and questions, starting with the possible stakeholder outcomes.

• Are stakeholder outcomes dependent on:
  I Solely on your own behaviour? (independence)
  II Solely on the other stakeholders behaviour (dependence)
  III On some combination of behaviours by both self and others? (interdependence)

When exploring the possibility of cooperation, it is essential to realize the relationship outcomes, as sub-par outcomes can form imbalances in power levels and erode trust if taken advantage of. If the outcomes are reliant solely on the your own behaviour, the analyst might need to reconsider if there is actual need for cooperation, as you are not dependant on anyone else in the alliance. On the contrary, if you are solely reliant on other stakeholders behaviour, it creates a dependence. This creates opportunities for sub-optimal behaviour, as stakeholders can end up not reciprocating. To give an example of this dependence, imagine you are a firm that produces product X. To do so, you need ingredient Y from the Foobar company. Foobar has
monopoly over ingredient Y as they are the only one that produces it. Price hikes and reduced availability in ingredient Y affect the price on your product X and your ability to produce it. You are therefore completely dependent on Foobar for your production of product X. However, if the relationship would function differently, such as product X is also needed by Foobar for their own product development, the relationship becomes interdependent. You rely on Foobar for ingredient Y and they rely on you for product X. The most optimal relationship between stakeholders is interdependence, where actors are dependent on some combination of both their own behaviour and others. Failure to reciprocate by either party results in a loss for both individuals. While this simplified example could be rare in real life, the relationship has a healthier balance. Seeking ways to arrange the relationship in a way that creates interdependence is highly encouraged.

When a dependent alliance is identified, incentives are formed for sub-optimal behaviour. This is also a factor for interdependent relationship and the risk grows when the structure of the exchange relations are indirect. The goal here is to provide insight into the possible exchange outcomes of certain structures and the risks they can carry. Whether the alliance is dependent or independent, the analyst should explore if incentives or opportunities of sub-optimal behaviour are in place.

- Is there an incentive not to reciprocate?
  - When? How? What are the consequences? Acceptable? Ways to counteract?

- Could anyone in the group free-ride?
  - When? How? What are the consequences? Acceptable? Ways to counteract?

If an incentive not to reciprocate is identified, the analyst should attempt to identify when it can occur, it what way, what the consequences are, if it is acceptable and if there are any ways to counteract this behaviour. At times, the consequences can be minimal or acceptable in the grand-scheme. If a high chance or blatant opportunities for non-reciprocity are identified, it is recommended to minimize them through methods such as negotiations or contracts. However, each case is different and there is no panacea that effectively eliminate this risk. If no options are available to reduce the sub-optimal behaviour, the culprit might not be suitable and replacements should be explored if possible. The above applies as well to free-riding behaviour. To clarify, free-riding is when partners receive benefits without supplying anything in return. This risk can sometimes be disregarded and is not as detrimental as non-reciprocity. If free-riders are identified, ways should be explored if their involvement is actually needed and if they can be excluded from the alliance.

The next step is exploring the structure of transactions and allocation of profits. The structure of transactions can be made in two ways, either negotiated or reciprocal. Reciprocal in this sense means that decisions made by the partner are made individually. The other partner(s) in the alliance rely on trust and good-will that these decisions made are performed with all parties interests in mind. The other option are negotiated transactions, where decisions are made jointly, and interests can be protected better.

- What is the structure of the transactions?
  - Negotiated: Decisions made jointly
  - Reciprocal: Decisions made individually

- What would be the allocation of profits/benefits?
  - Shared pool?
Negotiated beforehand or not?

- Do all parties involved know the value of what is being exchanged (profits/-knowledge/information/etc.)

The allocation of profits/benefits is likely what most partners consider the primary facet of the cooperation. Therefore, making it explicit how the allocation is arranged is vital. One option is to generate a shared pool. This can be suitable if the benefits of the cooperation are intangible, such as knowledge or information, or in some cases tangible, like infrastructure. However, negotiation before the cooperation begins is highly recommended as it protects both parties' interests. The power levels become more balanced and the cooperation is not solely built on trust. Knowing the value of the benefits/profits is also extremely important to ensure parties are not being deceived. This can often be difficult to pinpoint as intangible assets, such as knowledge or information, might be much more important to one party than the other. Knowing the full value of what is being exchanged is often hard but vital to sufficiently explore.

What also factors in is the level of trust and power between the partners in the alliance. Power imbalances in the relationships can result in bullying tactics and sub-optimal behaviour. Trust and commitment can also be hazardous. A lack of trust is detrimental in cooperation but blind trust is also inherently risky. Carrying trust towards partners, while securing fair allocation of benefits through negotiation, is ideal. However, it can be hard to determine the level of trust, commitment and power of other parties in the alliance. The following questions can aid the analyst to gain insight into these key factors, as according to Wu et al. (2014).

- **Trust**
  - Will the partner(s) keep promises made and protect your right?
  - Will the partner(s) be truthful and frank with you?
  - When making decisions, will the partner(s) consider your welfare as well as their own?
  - Will the partner(s) help you when you have problems?

- **Commitment**
  - Are the partner(s) willing to make sacrifices to help you?
  - Are the partner(s) willing to continue the relationship with you?
  - Are the partner(s) willing to spend a higher amount of time and effort with you?

- **Power**
  - Do you and the partner have the same power to influence each other in decisions, R&D and other joint activities?
  - Does the partner have the power to influence you in decisions, R&D and other joint activities?
  - Do you have the power to influence the partner’s decisions, R&D and other joint activities?
  - What resource capabilities do you have compared to the partner?

Further questions are sure to emerge when going through the list. This should not be considered a check-list but rather introspective questions to make the analyst really reflect on the level of the three key criteria in social exchange, trust commitment and power. If lack of trust is perceived, attempt to explore ways to strengthen it. This is easier said that done, as trust is built over time and a long period of trust building can be swiftly destroyed. Therefore, securing positions and allocation of
benefits with strict negotiations and contractual agreements is vital. Closely linked to trust is commitment. Are your partners willing to fully commit themselves to the relationship, continue it and even make sacrifices? These questions can be hard to answer and usually materialize over time. They should be kept in mind throughout the cooperation. The level of power is easier to perceive than the other two criteria. Resource capabilities, network sizes and image can play a large part in the ability to control the alliance. In some cases, power imbalances are acceptable, as long as they are not abused. To refrain from creating that dependence, ensuring the relationship is interdependent, if possible, making decisions jointly and negotiating for a fair distribution of profits/benefits can all aid in leveling out power imbalances.

At this point in the partner selection and relations structure process, a promising viable pool or even ideal candidates could be identified. Naturally, it can occur that no suitable candidates for an alliance can be pinpointed. Then the analyst should investigate if he/she can forgo the alliance and operate independently. If that is an unfeasible option, the difficult choice of the least bad option must be made.

3.3.3 Innovation Segment

From this high level analysis of the partner selection process, joined with the lower level analysis of the relationship structure, it should provide the analyst with increased clarity on the viable partners for cooperation. The next process is performing an analysis of the innovation itself, attempting to identify possible SFFs. The questionnaire is formed in a generalized way in an attempt to capture important aspects related to developing and implementing innovations. However, each project is different and the high heterogeneity of innovation endeavours could result in some questions to be vague or inapplicable in certain cases. For increased clarity, the questions are elaborated with examples and discussed.

Landscape developments

The first element that should be explored are the landscape developments. They pertain to the slow changes of society. They can be for example:

- Cultural changes
- Demographic trends
- Broad political changes

If landscape developments are identified, they should be kept in mind while performing the rest of the analysis. Cultural changes, such as attitudes, values and aspirations in society can provide opportunities for innovations to emerge. However, these are usually very slow in emergence. The other two developments are also normally slow emerging but can happen abruptly due to unrest. This is certainly the case for demographic trends, such as the influx of refugees due to famine or war, as was seen with the Syrian civil war in 2011, producing approximately 5.6 million refugees (UNHCR, 2020). This can create windows for innovations to emerge and affect other landscape developments, such as cultural changes. Broad political changes can also provide windows of opportunities when a new political party or a coalition gains power. The same can happen with radical changes in governance, shift of regimes or in political ideologies (e.g. from socialism to capitalism), or even increased focus on environmental policies.
Technological characteristics & Resources

- Is the innovation technologically feasible/difficult?
- Are there high costs/resource usage?
- Internal or external resources needed?
- Development of new technology or re-usage of older one?

Often, the technological aspect is the most vital part of the innovation development. The main question is if the innovation is technologically feasible and how difficult it is to develop, coupled with the resources needed to do so. It also needs to be studied if internal resources, such as knowledge and financial capabilities, are sufficient. For certain endeavours, in-house capabilities are lacking and therefore external resources must be sought. This could entail the need to seek cooperative alliances. Another opportunity is to explore potential grants, subsidies or tax exemptions for the proposed innovation. Currently, numerous governments around the globe are seeking ways to reduce emissions and introduce a higher share of sustainable energy. To do so, subsidies or tax exemptions are often provided for such endeavours. These windows of opportunity should be tracked.

User behaviour and Public perception

- How will users perceive the innovation? (Alternatively: What is the public’s perception of the innovation or of the problem it intends to solve?)
- Is it difficult to operate/utilize (usage) for users?
- Will the innovation meet users needs?
- Are users familiar with the innovation (something similar they have used before)?
- Specific technology they must own/access/know how to use to utilize innovation (e.g. smart phone/electric car/etc.)?

User behaviour practices attempt to explore how user perceive and intend to use the innovation. Groundbreaking innovations tend to shape user behaviour but conversely, innovations are also shaped by user behaviour and needs. It can prove beneficial to gain insight into public perception, by exploring the number of positive versus negative reviews or discussions in journals and grey literature, regarding the innovation or variations of it that have been attempted. Exploring if the innovation is accessible to a wide group of users, or that the intended user base has an easy way of operating, can shape the development of the endeavour. Avant-garde innovations, that users are unfamiliar with, can find increased success by operating in a way that reminds users of something previously released that they enjoyed, or breaking the path towards a new era, shaping user behaviour in the process. The introduction of online payment is a case of the latter. Trends help immensely in this process. Path dependencies also come into play here. Once newer, contemporary designs are released, they rarely revert back to previous versions or designs. Such is the case with touch screen display, where buttons are rarely seen nowadays in new technology. If these questions seem hard to answer, discussing with or performing surveys on the intended user groups could aid in clarifying the needs of the users.

Application domains (markets) & Market formation

- Is the market accessible for introduction of new innovation/technology?
- How susceptible is the market to changes (e.g. technological/social) or introduction of new innovations?
• Is the market growing or shrinking?
• Is there a high number of competitors?
• Is the market competing with other markets? (e.g. different modes of the freight transport market)

The application domain, or essentially the markets where the innovation will be introduced, can determine success or failure. A highly saturated market can be difficult to penetrate and gain a footing in. Highly competitive but ever growing markets, such as information technology, provide numerous opportunities for innovative endeavours, as has been seen with artificial intelligence and cloud solutions, which then provide capabilities to use that tech for additional innovation development. Penetrating locked-in markets with high monopolization, where power imbalances are extreme, is rarely effective, unless providing something niche or targeting a discrete market segment. Seeking ways to access protected markets can be highly beneficial in the early, crude stages of innovation implementation. If tariffs, quotas, subsidies or other tools are in place in certain markets, they can aid or hamper, the implementation of the innovation. Therefore, exploring the market status and even ways to pivot to a new market, if conditions are substandard, could be advantageous.

Symbolic meaning of technology & Ethical concerns

• Is the innovation a symbol for wealth/status?
• Does the innovation alienate certain groups?
• Does the innovation offend certain individuals/groups?
• Is the innovation ethical and moral?
• Has the innovation potential to cause environmental or other types of damage?

This element explores the symbolic meaning of technology, what status it provides, the societal effect it can have and potential ethical dilemmas. Each entrepreneur has to evaluate this elements on the basis of their own believes. The production of weapons can be seen by some as unethical and by others as a business opportunity. Additionally, industry shaping innovations can put myriads of employees out of work. The author is not attempting to be a paragon of virtue by making the analyst exploring these aspect, but everyone serves a duty to our earth and to one another. If the innovation has the potential to cause damage, either environmental or to humans, the author highly recommends the exploration of alternatives.

Infrastructure

• Is physical or virtual infrastructure needed?
• Are infrastructural changes needed (such as to introduce the innovation or extract its full potential)?
• Is the current infrastructure suitable?
• Are the high costs of infrastructure changes/maintenance?

The aspects of infrastructural needs are often apparent when developing innovations but are still vital to sufficiently explore. Sometimes current infrastructure needs to be changed or adapted to suit the innovation, or to extract its full potential. This is the case with 5G implementation, where the shorter wavelength calls for increased amount of cell towers. A more obscure aspect is the maintenance costs of the infrastructure and its lifetime, which is not always apparent at first.
Industry structure & interests

- Is the development of the innovation reliant on a scarce resource, or one that fluctuates in price/availability?
- Are there legal barriers or limitations in the way for innovation introduction/development?
- Is there high availability of means for production of the innovation?
- Are there stakeholders with interests to protect (e.g. competitors that want to protect their market status).

The industry structure is linked to the application domains of the innovation. It attempts to explore if the industry is saturated (perhaps locally), if certain industry barriers are in the way and what means are available for the production of the innovation. If a mandatory resource is needed for the development of the innovation, it is vital to explore if high demand or fluctuations in price are common for the resource. This is the case with silicon. It is heavily used in the computer and microelectronics industry, but is also necessary to produce contemporary solar cells. A high demand or a lower supply of silicon results in price hikes for both industries. The means of production for the innovation can also effect its development and implementation ability. If insufficient means, such as knowledge, space or facilities are unavailable in-house or locally, outsourcing globally could be the most suitable option. In turn, transportation costs and other expenses surface. Finally, analysts should be alert of the current dominant technology or artefact the innovation intends to replace or intervene in. Competitors and other stakeholders might stand to lose gains, such as financial, if the innovative endeavour seeks to compete with the dominant technology or artefact. If they possess sufficient power, they can attempt to slow down or block the development and/or implementation of the innovation if a chance presents itself. The analyst should explore if this could pose a threat and seek ways to minimize negative outcomes.

Policy & Decision making procedures

- Is the innovation adoption in-line with the organization’s (innovation developers/adopters) vision and the current in-house political climate?
- Are there any specific government, local or global policies that can legitimize or aid the innovation adoption? (e.g. reducing fossil fuels, subsidies, tax exemptions)
- What is the public/private perception of the issue the innovation intends to solve/intervene?
- Political feasibility of the innovation?

Both public and private (in-house) policies can affect innovative endeavours. Larger firms can experience tensions in communication and vision and therefore it can be beneficial to explore the current climate. If changes in top management are taking place, in can both open windows for innovations and halt their advancements. Divergence in companies long-term visions can also have the same effect. For entrepreneurs or smaller firms, this becomes less of an issue. As discussed previously, public policies can provide aids through subsides, tax exemptions or other stimuli and should be explored. However, despite the lack of any public stimuli, public, private and political perception on issues and the ideal way to solve them can also provide legitimacy to innovative endeavours. The global push for sustainable energy and pollution reduction has increased legitimacy for electric and biofuel vehicles and created floating wind farms in Scotland. Although, the perception of issues and the perceived ideal way to solve them is not always the most suitable solution.
This is affected by sanctioned discourse, “the prevailing dominant opinion and views, which have been legitimised by the discursive and political elite.” (Jagerskog, 2002: p. 1). Nuclear energy is one of the cleanest and safest ways of generating energy available today. Once operational, nuclear plants have similar emissions to solar and wind energy. However, due to accidents, such as in Chernobyl 1984 and Fukushima in 2011, public opinion has been extremely negative towards nuclear energy, with currently only 10% of the world’s electricity being produced in nuclear plants (World Nuclear Association, 2020). Therefore, if the development and/or implementation of the innovation can be affected the public sector, its political feasibility can be a major hurdle or a window of opportunity. Politicians are often reluctant to make decisions that reduce their likelihood of re-election, especially when nearing elections. Closely linked to the aforementioned aspects is also recognizing who has the power to influence important decisions that relate to innovation development and implementation, whether it be in-house, alliance based, private or public.

**Techno-scientific knowledge**

- Is significant R&D needed for innovation development?
- Is there enough knowledge in-house or does it need to be outsourced?
- Is the knowledge niche or general (do many organizations have access to it?)
- Has this innovative endeavour been tried before?
- What was the success of previous tries? What can be learned?

The final aspect to explore is the techno-scientific knowledge. It attempts to encompass the knowledge and skill needed to develop and advance the innovation. If the innovation is technically difficult and requires expertise or high competency performing specific tasks, it can be costly and time consuming to acquire. If the knowledge needed is very general and several organizations or entrepreneurs have access to it, the innovative idea could be replicated and developed ahead of the original. Therefore, the analyst should be careful of what aspects of the innovation he is sharing, for what purpose and how he can protect intellectual property. This might seem obvious but numerous examples exist of intellectual property theft. Even without ever knowing about the existence of a similar innovation, firms/entrepreneurs can be beaten to market by similar innovations and lose out on the benefits. Exploring issued patents and investments in this type of R&D can provide the analyst with some insight into this issue. Finally, much information can be gained by exploring past efforts of similar innovations and the successes and failures they had. Barriers and hurdles can possibly be circumvented or reduced by not repeating history and making the same mistakes twice.

### 3.4 DISCUSSION

#### 3.4.1 Connection between used theories & Arguments for theory selection

The theories selected to formulate the framework aim to get a concentrated view on the potential cooperating candidates, by exploring their social relations and potential interactions. Doing so can allow the analyst to identify potential cooperative challenges based on the expected behaviour of actors. Nonetheless, there are still myriads of other challenges that need to be identified and overcome, such as technological, societal and ethical. The second section of the selected theories take aim of that. Due to the selected theories, the building-blocks that make up the cooperation and the innovation segment lack a connection. The selection of partners and their relations naturally can affect the requirements of the innovation. The CIAF
does take note of this factor but the innovation segment is not explicitly affected by the cooperation segment. The chosen first step in the framework was evaluating which potential candidates could be suitable. Creating a viable pool, or even pools, of potential cooperating partners, can allow the analyst to focus on assessing stakeholder relations. The selection of partners can involve both neutral partners and those in direct competition with the project owner. Alves and Meneses (2015) partner selection framework was chosen to capture both of these aspects. If the choice of partners is unary, the partner selection can be overlooked but the potential social exchange of the alliance (or the sole partner) should be evaluated. To do so, Molm (1994) social exchange theory is selected to evaluate the elements of the relationship, such as partner’s structure of outcomes and transactions, identifying potential sub-optimal behaviour and the allocation of benefits the alliance can generate. Coupled with Molm is Wu et al. (2014) key exchange issues in social exchange, namely the level of trust, commitment and power in the relationship. An imbalance of these elements can produce turmoil in the relationship, resulting in a defective and disadvantageous alliance. A connection can be made between the theories of Molm (1994) and Wu et al. (2014). Molm addresses the same key exchange elements as Wu, reciprocity, commitment, power and trust. However, Molm does not address if these elements are equally important or impactful in alliances. Wu makes this explicit by exploring if some elements have more of an impact than others in cooperative relations. This results in disregarding reciprocity but including the other three. For a comprehensive analysis of the challenges an innovation might face when commencing development, three frameworks were selected to capture a wide array of analysis techniques and theories. The first is Feitelson and Salomon (2004) political economy model which describes the factors and barriers new ideas must break through before being adopted. It focuses on the political challenges and the correct “policy windows” for innovations to break through. Due to not all innovations being in the public sphere, Hekkert et al. (2007) and Geels (2002) frameworks were added. These two frameworks are connected based on their view of technological transformations being embedded in a system of systems. While also considering similar factors as Feitelson and Salomon, they take a broader view, incorporating the private sphere. The focus is on more practical approaches, with additional factors and elements being considered.

Innovation endeavours tend to be very heterogeneous, with distinct challenges and considerations to be evaluated each time (Van der Panne et al., 2003). Creating a one-size-fits-all recipe for cooperation is unlikely to be effective. The selected literature and the method of approaching the cooperative and innovative challenges are partially aimed at suit ing Transvectio’s project, but not exclusively. A framework performing the same function as the one formulated in this thesis does not exist, to the best of the authors knowledge. Therefore, the characteristics of the project were used as a reference to assess the angle of approach. Nonetheless, it was not tailored specifically to the project. Rather, an attempt was made to make it general enough to possibly aid projects facing similar challenges. Using only one reference case is contradicting to what was written earlier, that innovative endeavours have heterogeneous challenges and considerations. However, an argument can be made that these endeavours have several homogeneous characteristics. If cooperation is an integral part of a project’s success, a partner selection will likely be made at some point in the process. This is relevant both for a small group of potential partners and when facing a broad selection. Building on top of that is Social Exchange Theory. It is utilized to aid the analyst in mapping out the relationship structures and interactions of a cooperative alliance. A sub-par relationship with large power imbalances, lack of trust, high risk of free-riding or sub-optimal behaviour is unlikely to be fruitful or long-lasting. Gaining a perspective into the potential relationship outcomes between stakeholders could help identify associated challenges and separate good partnerships from bad ones early on. Furthermore, the results of the literature
review (Chapter 2.1) were taken into consideration. The findings show that cooperation was determined a success factor or a very important factor. Additionally, Widén et al. (2014) recommend stakeholder inclusion early on in the innovation process, as well as Arvidsson and Browne (2013) determining conflicting objectives of stakeholders as a barrier. Performing the cooperation segment first takes light of this, making a partner selection and exploring the potential relationship structures. This is done to make the analyst consider the early inclusion of stakeholders and their potential objectives and roles.

The second segment is focused on the innovation’s characteristics, relating to technical, societal, ethical and other aspects. As previously noted, the three innovation analysis frameworks of Feitelson and Salomon (2004), Geels (2002) and Hekkert et al. (2007) were selected to capture a wide array of analysis techniques and theories. Selecting only one of the three would result in an incomplete analysis and missing factors. Swapping out any of them, or even all, would result in a drastically different CIAF. The author was familiar with the selected frameworks and determined them to be sufficient for this first iteration of the CIAF. Nonetheless, even with the inclusion of three frameworks, the CIAF is not exhaustive.

### 3.4.2 Advantages & limitations

This framework could hopefully aid entrepreneurs or firms to analyse their innovative endeavours, specifically those engaging in cooperation. What was interesting to see when formulating the CIAF is that none of the innovation frameworks addressed ethical concerns. To remedy this shortcoming, it was specifically added into the CIAF. Ethical considerations can often tend to be ignored or glossed over so their explicit addition is meant to combat that. The framework possesses several advantages over other forms of innovation analysis frameworks. One of those advantages, as previously mentioned, is the increased focus on cooperation. Attempting to make those engaging in innovative endeavours be attentive to the numerous downsides of partnerships, these introspective questionnaires could steer players away from potentially detrimental ones. Conversely, it could guide them towards more healthy and beneficial alliances. By combining three separate innovation frameworks and extracting their analysis tactics, the framework manages to capture numerous angles and perspectives of innovation analysis. Although, this multifacetedness could also be considered a downside, as the framework is quite time consuming to sufficiently complete. Evaluating the framework critically exhibits several weaknesses. Little focus is put on the financial aspects of the innovative endeavour. Fundamentally, if the innovation’s costs exceed the benefits it creates, it becomes financially unfeasible. While a financial feasibility analysis might be more suited to explore such facets, the framework could have made it explicit. The framework requires considerable knowledge of the viable partner for cooperation. If the partner is a black-box and little to no information is acquired, it can be strenuous to answer some of the questionnaire, in an attempt to gain insight into the potential relationship. In that case, speculation and argumentation would have to suffice, using the framework’s leading questions to brainstorm. This also highlights the difficulties of successfully cooperating, which can be exacerbated by the strategic behaviour of players when entering negotiations, refusing to reveal their true intentions until it favours them. Transvectio’s project and its characteristics affected the formulation of the framework. With no comparable framework existing in the literature, the project was partially utilized as a model to create the CIAF. This is for example presented in the framework’s focus on the private sector, rather than the public. Innovation projects can be very dynamic and heterogeneous with different challenges and factors to be considered each time. Therefore, it is likely the framework would be formulated differently, given a different assessment case. Finally, the link between the cooperation and the innovation segment of the
CIAF is not very strong. The analysis performed in the innovation segment can be affected by which stakeholder is chosen to cooperate with. Little attempt was made to connect the two segments and it can be considered a downside of the framework.
In an attempt to engage the reader, sufficiently describe Transvectio’s current situation and their innovative endeavour, a detailed explanation of the current situation is given. First, background information is provided. First, Transvectio’s innovation project is detailed and depicted. Second, all gathered data for the project is presented.

Note that some information has been anonymized or manipulated to protect identities and sensitive data.

4.1 THE INNOVATIVE RAILWAY PROJECT

Transvectio operates a railway terminal in a terminal area in Europe. As of 2019, there are over thirty players, offering railway transportation services, utilizing the terminal area. The heterogeneity of the group of railway players is quite notable. They operate as either forwarders or carriers but some also own terminals or provide terminal services, such as Transvectio. The companies vary heavily in size and operation capabilities, being based in several countries. Ownership also varies, being a single or a majority shareholder, owned by multiple shareholders or subsidies of governmental owned entities. It is hard to generalize whether a certain segment of the group is more or less willing to engage in cooperation with Transvectio. Attempting to map these players into groups based on certain characteristics, such as type of operations, investment activities and ownership could potentially provide an idea of their willingness. However, previous ties, image, level of risk-aversion and numerous other aspects can all affect their perception towards cooperation.

The Terminal Area Operator

Oculus is the owner and operator of the terminal area. Oculus service the terminals. The tasks include providing heavy machinery, equipment, blue collar workers and shunting, as well as logistics services. This work is performed by either Oculus, their subsidiaries or participating interests.

4.1.1 The Innovation

Transvectio aims to develop an online platform, which displays all available connections and destinations through the terminal hub railway network. It would also provide clients with additional services, such as pre- and post carriage, shunting between terminals, electricity plug-ins, storage, customs services and more. Although the details and the technical direction that Transvectio wants to take is currently undecided, it can be easily presumed that the development requires significant consideration. Technical feasibility, user requirements, resource needs, ethical consideration and numerous others facets need to be identified and addressed. The platform needs to be constantly kept up-to-date, requiring seamless data transfers and connectivity to the relevant players and their systems.
A (very) simplified mock-up is presented in Figure 4.1. Note, that this is only the author’s depiction to give the reader a feeling of the platform’s functionality and visualization. The main goal of the project is financial gain. The project could also strengthen Transvectio’s and the terminal area’s status as a strong railway hub in Europe and can allow the terminals, railway companies and consumers to reap benefits, directly and indirectly, from the increased services, visibility and accessibility.

The project is currently still in the early stages of development, only being conceptual at the moment, as several delays, such as COVID-19, have halted the progress. Currently, the project and the details surrounding it are very crude, with this thesis being the starting point of exploring it in more detail. The original plan of action, with regards to the application of the platform, is intended to be performed in several phases, described below. The continuation from one phase to the next is dependant on the previous being a success and that sufficient resources and interest is in place to move forward. It is vital that the initial release garners sufficient exposure and interest to solidify its status in the market, to allow for further development and growth.

1. **The initial release phase** – The platform is developed and released containing solely Transvectio’s terminal services and rail connections. This attempts to offer clients increased clarity in the available connections and services, where paperwork and information can all be found and managed in one place.

2. **The integration phase** – Additional connections are made available by cooperating with the previously listed railway companies and other stakeholders. The platform would display all the additional connections, as well allowing invoices and information to be found and managed all in the same place. This augmentation would be reliant on the level of success and interest from the previous phase, along with the willingness of the stakeholders to cooperate.

3. **The expansion phase** – Subject to sufficient success in the first two phases, a roll-out of the platform in Europe is conducted, integrating other terminal areas and hubs. The details of this phase are still largely unclear and undecided.

The transition from one step to the next might seem like a simple linear progression, but that is certainly not the case. The shift from the first step to the second
entail substantial changes in complexity and difficulty, due to the need for cooperation with other stakeholders. While the first phase certainly is faced with several challenges, the analysis changes drastically when engaging the second phase, and even more so in the third. The platform’s development and its goal is decided internally for the most part during the first phase. When attempting to start the second phase, external aspects are of much greater importance, such as system alignment with cooperators as well as making the platform appeal to both stakeholders and a much larger group of clients. Transvectio is considering to approach stakeholders for cooperation before the initial release. For that reason, the main focus of the analysis conducted in this thesis will be on the first two phases and the associated challenges. The third and final phase is only considered as a “best-case scenario” in the long-term vision and is out of scope for this research.

4.1.2 Presenting the data

This section presents what is currently known about the project. It will then be used as an input for the framework. This has been gathered through talks with Transvectio’s representatives and through gray literature. Ideally, potential cooperative stakeholders would be approached to discuss their possible involvement in the project. However, if stakeholders gain knowledge of the project being undertaken, they can anticipate it and act accordingly. This can be detrimental for Transvectio if it is in the stakeholder’s best interest to halt or reduce the project’s success.

Ownership structures

There are currently three different types of the platform’s ownership structure being explored by Transvectio, presented below:

1. No Change - The ownership would retain fully with Transvectio. The development and progression of the project would be assigned to a group of employees, alongside their daily duties.

2. Joint Venture (JV) - A JV would be undertaken with the stakeholders willing to cooperate. The level of ownership would be more balanced in this structure, but Transvectio would always retain the majority of ownership and control. The development and progression would be mostly within Transvectio, but more transparent for cooperating stakeholders.

3. A Separate Entity - A fully separate entity would be created. This entity would contain a dedicated Transvectio team, fully focused on the development and progression of the project. The team would make independent decisions, separate from its parent company. Transvectio would still retain full ownership, but not have control over activities and decisions.

Capabilities

Transvectio has strong IT capabilities and develops most of their software solutions through the an integrated environment. It allows developers to develop and release applications quicker than usual.

Oculus possesses a vast network of partners and business connections. However, Transvectio believes they lack the IT capabilities of developing the platform on their own. Due to the substantial resources Oculus controls, being namely the network and customer access, Transvectio is exploring the option of including Oculus in the initial platform release. Oculus’s inclusion could entail giving them a significant control and portion of the benefits the platform could create, likely more than Transvectio is willing to award. Transvectio believes it has sufficient resources to
move forward with the platform release on their own but acknowledges the substantial benefits the cooperation would carry.

External Aspects

Transvectio perceives that the terminal hub lacks exposure and transparency for clients. This view is based on soft data, currently with no hard data to back it up. Contacting a carrier or a terminal, attempting to find information on connections, what options are available, how to get assistance and who to contact are some of Transvectio’s perceived problems of the terminal hub. It is not known how many of the stakeholders in the area share Transvectio’s opinion.

Oculus has been putting hopes into the New Silk Road connection with the Asian market, mainly China. Improvements in infrastructure on the New Silk Road and efforts to harmonize customs modalities with China has allowed rail traffic to grow significantly.

The share of competition between rail carriers, operating in the terminal area is rather low. To clarify, not all carriers offer connections to all locations. Popular transport locations, such as large cities or other major hubs have several carriers offering transport, while some shipping points are offered by one or few carriers. Transvectio perceives that the direct competition, where carriers ship to the same location, is only about 10% of total transportation via the hub.
This chapter presents the analysis and identification of SFFs, that might be faced during the project development and implementation. To remind the reader, the success factors are those that can aid a project’s realization or provide it an advantage, while failure factors are those that can inhibit realization or curb success. The questionnaire from the CIAF, alongside consultation with Transvectio’s representatives and the expert interviews have been utilized to formulate the following section. It is presented in the same chronological order as the framework to maintain consistency and clarity for the reader. The complexity of the project entails numerous factors that can be encountered, resulting in a lengthy discussion. To make it explicit where the used information was gathered, references are added to the Interviews chapter (Chapter 6). Not all questionnaires are explicitly answered. This is due to them either not applying or being answered earlier in the analysis. Several factors and issues are more pressing and need explicit responses or decisions. Therefore, a summary is formulated at the end of this section, detailing the key SFFs.

5.1 COOPERATIVE INNOVATION ANALYSIS FRAMEWORK RESULTS

To retain the structure of the framework and remind the reader, the questionnaire is repeated for each segment.

5.1.1 Partner Selection

- Are there any previous (personal or business related) relationships with other stakeholders?
- How is the current relationship with stakeholders?
- Can each party contribute something of value to the partnership?
- Is each party free to negotiate the terms and conditions for the cooperative agreement?
- Can all parties find a positive balance between the pros and cons of the relationship?
- Do all parties have a shared vision of goals and is their interpretation and perception of the market aligned?

Previous ties and current relationships

Transvectio has been in business relations with Oculus since starting terminal operations, through their service agreement. They are bound in a long term contract, covering the next two decades. From Transvectio’s perspective, the terms of the agreement are currently viewed as unfavorable, but were deemed necessary at the time they were accepted. The agreement has often been the spark for disputes, resulting in deterioration of their relationship. However, both companies have been
actively working on strengthening their bond, which is gradually improving. Additionally, Transvectio has ties with several players in the area. Transvectio perceives that they have neither particularly strong nor weak relations with stakeholders, aside from the previous strain with Oculus. However, stakeholders perspectives towards Transvectio could prove to be an impediment for cooperation. Transvectio is perceived as not always being easy to work with, focused on strict agreements to reduce risk in cooperation. Transvectio is a large player and several incentives are in place for cooperation, although the perception is that they might not always be the first choice, if various options are available. When initiating cooperation alliances with stakeholders, this must be taken into account to ensure that they will perceive sufficient benefits from the relationship, and that they obtain favourable terms in negotiations. If they perceive Transvectio to be unyielding in negotiations, they might have less incentives for striking a deal.

**Contribution to the partnership**

As previously noted, Transvectio possesses strong IT capabilities to develop the platform but lacks networking capabilities to promote the platform, generate exposure and capture clients. Alternatively, Transvectio believes that Oculus lacks the necessary IT capabilities but they control a vast network of partners and access to potential customers. The contribution of other stakeholders, such as carriers or terminals, is less transparent. Stakeholders cooperating and offering their services on the platform is binary, either they join or not. On the other hand, the amount of exposure the platform receives, through the stakeholder’s network, is less tangible. It should be expected that carriers will not direct their clients towards the platform, if they have previously established contact or business with them.

**Freedom of negotiation**

Between Transvectio and Oculus, each party is certainly free to negotiate the terms and conditions of the agreement. Failing to cooperate with Oculus could be detrimental to the project’s success. The same situation occurs with other stakeholders. Although, due to the amount of potential cooperative players in the area, Transvectio could have more room to generate better conditions for themselves. This must be approached carefully as the platform’s success is subject to the network effect. Increased number of stakeholders offering their services on the platforms attracts more clients. Therefore, Transvectio should attempt to consider every partner as being viable. With more stakeholders willing to join, the chance of success increases.

**Shared vision and market perception**

It is safe to assume that Transvectio and other stakeholders do not have shared visions and do not perceive the market in the same way. The amount and heterogeneity of stakeholders in the area results in different views and focus on different markets. However, they all have a common goal of wanting to generate more revenue and securing more clients. Although, they probably have conflicting views on how to do so. A big question is whether the introduction of the platform will be perceived as a detriment or an opportunity for stakeholders. This is discussed in detail later in the chapter.

**5.1.2 Alliances’ Social Relations & Interactions**

- Are stakeholder outcomes dependent on:
  I Solely on your own behaviour? (independence)
  II Solely on the other stakeholders behaviour (dependence)
III On some combination of behaviours by both self and others? (interdependence)

Currently, a dependency can be observed between Transvectio and Oculus, where Transvectio relies on Oculus for terminal services. Whether Oculus is fulfilling their contractual obligations towards Transvectio has often been the spark of conflict between the parties, pertaining to non-transparent activities. These concerns could be tenable as Oculus holds stakes in several of the terminals they service, therefore having an incentive to prioritize activities or directing clients towards those terminals. In such a relationship, the decision to reciprocate lies entirely with Oculus and being the only service provider, they hold most of the power in the relationship.

Exploring the scenario of forming a cooperative alliance between Transvectio, Oculus and other carriers, this dependence can be transformed into a more interdependent relationship. As previously noted, Oculus lacks IT capabilities but possesses a vast network. Alternatively, Transvectio has strong IT capabilities but needs sufficient exposure for the platform and a large user-base, an issue that Oculus’s network can help remedy. Utilizing Oculus’s network can provide a strong kick-start during the delicate initial release of the platform. Consequently, an interdependent relationship can be formed, where Oculus relies on Transvectio for their IT capabilities and Transvectio on Oculus’s networking abilities. The power level in the relationship will be more balanced. Similar situations are perceived when exploring potential cooperative relations between Transvectio and carriers willing to offer their services on the platform. The carriers have capable networks which collectively can expand exposure for the platform and in turn reap the benefits the platform can create.

* Is there an incentive not to reciprocate?
  - When? How? What are the consequences? Acceptable? Ways to counteract?

* Could anyone in the group free-ride?
  - When? How? What are the consequences? Acceptable? Ways to counteract?

If an alliance is formed between Transvectio, Oculus and cooperating carriers, opportunities for non-reciprocal actions and free-riding could emerge. Despite that an alliance can be formed with interdependent relationships between the parties, Transvectio is still exposed to a non-reciprocation risk. Stakeholders joining the alliance and offering their services on the platform is binary, either they are on board, reaping the benefits of the platform, or not. On the other hand, the amount of exposure the platform receives, through the stakeholder’s network, is less tangible. As previously noted, it should be expected that carriers will not direct their clients towards the platform, if they have previous established ties with them. The platform’s main user-base would therefore likely be new clients or clients searching for better terms at another carrier. There are few ways to counteract this issue. It would be unfeasible to force cooperative partners to direct their current and new clients toward the new platform, as they would never agree to those terms. While this situation is not ideal for Transvectio, there is no apparent remedy.

* What is the structure of the transactions?
  - Negotiated: Decisions made jointly
  - Reciprocal: Decisions made individually

* What would be the allocation of profits/benefits?
  - Shared pool?
Negotiated beforehand or not?

- Do all parties involved know the value of what is being exchanged (profits/-knowledge/information/etc.)

The structure of transactions in the alliance should be negotiated, with terms and conditions clear for participating players. However, the exposure and advertisement of the platform, from cooperating carriers and Oculus, is in essence reciprocal in nature, although, that can be negotiated to some extent. Decisions regarding the platform will likely be made solely by Transvectio. Nonetheless, they are influenced by stakeholders due to Transvectio’s need for cooperation. The allocation of profits and benefits is a shared pool, although not an equal one. Receiving benefits from the platform in the form of increased business or exposure, will not be equal for all players involved. Some will gain more from the cooperation than others. Exploring the value of what is being exchanged, in this case what the benefits are of joining the platform, is rather obscure. Cooperating stakeholders will consider that joining the platform will simply shift business away from them to other players, or vice versa. If a high number of stakeholders perceive the platform to have this effect, it can be detrimental to success.

As previously noted, the composition of the alliance (ownership structures) can be formed in several ways (Table 6.3, q. 14). The first option is to have Transvectio as a singular entity (no change), fulfilling their duties as a booking platform operator, carrier and terminal operator. Although that could carry a conflict of interest and reduce transparency for the players involved. The second option is to engage in a JV. A JV entity would be created that operates and manages the platform activities. Co-operating players would be a part of the JV, although Transvectio would still carry the ownership and management of the platform. This option allows for more transparency for cooperating stakeholders. Possibly, the JV could be created with a core group of stakeholders willing to cooperate. This could serve as an attracting force for other stakeholders to join. The third option would be to create an entity, entirely separate from Transvectio, that would act and make decision independently, with dedicated employees. This can serve to portray an image of transparency and trust. However, Transvectio would still be a financial backer and likely a majority owner. However, as such, situations where conflict of interests occurs, Transvectio has a large incentive to influence decision-making. Despite creating a separate entity, the question still remains how biased the decision-making will be, as well as the additional costs this specific option would carry. Private investors, those only holding a financial stake (to reduce conflict of interest situations), could also be enticed to join in order to alleviate Transvectio as the only financial backer. Each option entails advantages and disadvantages, conditional on what direction Transvectio intends to take, with regards to operations and end-goal of the platform.

5.1.3 Levels of trust, commitment and power

- Trust
  - Will the partner(s) keep promises made and protect your right?
  - Will the partner(s) be truthful and frank with you?
  - When making decisions, will the partner(s) consider your welfare as well as their own?
  - Will the partner(s) help you when you have problems?

- Commitment
  - Are the partner(s) willing to make sacrifices to help you?
- Are the partner(s) willing to continue the relationship with you?
- Are the partner(s) willing to spend a higher amount of time and effort with you?

* Power
- Do you and the partner have the same power to influence each other in decisions, R&D and other joint activities?
- Does the partner have the power to influence you in decisions, R&D and other joint activities?
- Do you have the power to influence the partner’s decisions, R&D and other joint activities?
- What resource capabilities do you have compared to the partner?

The level of trust, commitment and power in the proposed alliance are hard to accurately determine but a viewpoint can be gained through argumentation and by exploring the situation. Keeping in mind that Transvectio’s reputation, as previously outlined, is sure to have an effect on these aspects. Starting with trust, Transvectio being focused on strict agreements can provide stakeholders with the perception that Transvectio will honor their agreements and refrain from opportunistic behaviour. When considering if stakeholders involved will be truthful and frank, it is safe to assume that strategic information will be withheld and not shared unless necessary, if it provides stakeholders with an advantage in negotiations. Similar situation are identified when considering the commitment between stakeholders in the proposed alliance. It should naturally be assumed that stakeholders will protect their own interests before others. The level of power is the most dynamic of the three aspects. In the proposed alliance, Transvectio is the project owner and platform operator, and will hold most of the power in the relationship, deciding who is allowed to join and under what conditions. However, there is interdependence between Transvectio and cooperating stakeholders, where Transvectio seeks to benefit from network exposure for the platform, and stakeholders from increased business opportunities by offering their services on the platform. This interdependence allows the power levels to maintain, in theory, an acceptable balance. Although, the complex dynamics of varying interests of cooperating stakeholders and Transvectio’s goals can shift this balance and is very hard to accurately determine.

5.1.4 Landscape Developments

* Cultural changes
* Demographic trends
* Broad political changes

Currently, no known relevant landscape changes are taking place. Exploring landscape changes on a smaller scale, there are also no known changes taking place locally within the terminal area. However, the outbreak of COVID-19 has had major effects on the entire world. It has effectively halted or shut down numerous projects and endeavours. Freight volumes are also impacted and have been reducing (Table 6.3, q. 6). The COVID situation got progressively worse throughout February and around mid March, lock-downs and social distancing rules were gradually put in place. Naturally, this halted all development of the project, as it was low on the priority list compared to the numerous pressing issues. While society is slowly beginning to get back on track, the situation has to be monitored closely as it unfolds. It is unsure when preliminary steps for the project will be undertaken but other than delays, COVID has not affected the project in a major way.
5.1.5 Technological characteristics & Resources

- Is the innovation technologically feasible/difficult?
- Are there high costs/resource usage?
- Internal or external resources needed?
- Development of new technology or re-usage of older one?

Feasibility, costs & state of technology

From a technical perspective, the innovation is very feasible. The platform will be developed in-house, through Transvectio’s IT department, which has received an increased focus and has been expanded during the past few years. The development of the platform does not entail development of new, untested technology. As is with IT projects, costs and time planning often exceed estimates. While development of the platform does not present itself as costly, it is difficult to estimate, as numerous issues can emerge.

Need for internal or external resources

Initially, if the platform is solely offering Transvectio’s connections and services, data needs, resource usage, development and release are all internal. However, when expanding the platform to include other companies, implementing their connections and services into the platform, the flow of data and information between Transvectio and cooperating companies needs to be seamless. The level of IT for these cooperating companies must therefore be competent enough to provide what is needed. Fundamentally, some adjustments with regards to companies data and data transfers are needed to ensure sufficient competency, as the platform will need to be constantly kept up-to-date. It should be taken into account that the computer system connections between Transvectio and cooperating companies will likely not be seamless without adjustments. The complexity and amount of these adjustments could bring some additional costs and delays, and if they are costly for stakeholders, it might deter them away from joining the platform.

Although an issue arises, as the larger players, whether carriers or other stakeholders, also have sufficient IT capabilities to develop a similar platform. Since the project is only in the exploratory phase, with no actual development started, the innovation can easily be duplicated by competent players. To counteract this situation, the optimal approach would be to move forward with the development of the platform, ideally having completed a pilot when prodding stakeholders for cooperation. However, this would entail significant sunk cost if the project is disbanded.

5.1.6 Future considerations

Emerging developments in IT, such as block-chain and cloud-based solutions could have an effect on the project development. With the project having no set time frame, only an approximation that the initial release could be in the next year or two, affected by numerous factors such as resource availability, IT development delays, other pressing issues and complications, these emerging IT solutions could be an opportunity to explore (Table 6.3, q. 9).
5.1.7 User practices and Public perception

• How will users perceive the innovation? (Alternatively: What is the public’s perception of the innovation or of the problem it intends to solve?)

• Is it difficult to operate/utilize (usage) for users?

• Will the innovation meet users needs?

• Are users familiar with the innovation (something similar they have used before)?

• Specific technology they must own/access/know how to use to utilize innovation (e.g. smart phone/electric car/etc.)?

User perception

Current established clients of both Transvectio and other railway companies have grounded methods in booking transport, performing them through their respective carrier. With the introduction of Transvectio’s online booking platform, user behaviour has to be re-shaped to make them aware of the platform and as a point of contact with the carrier. New clients, faced with numerous carrier options, need to be both aware of the platform, be guided towards it and wanting to use it. Shaping user behaviour to make current and new clients use the platform can be a sluggish process, exacerbated by inadequate exposure.

5.1.8 Meeting user’s needs

An opportunity can be identified when considering if the innovation will meet user’s needs. As previously noted, Transvectio perceives that the terminal area lacks transparency and information flow for clients. When a new client attempts to book rail transport through the Oculus hub, finding details on available connections, services and general information is difficult and confusing. If this is the case, it likely affects other carriers in Oculus and their visibility for clients. This has been remedied somewhat with an increased focus on the Asian market, namely China. Improvements in infrastructure on the New Silk Road and harmonization of customs modalities with China has allowed rail traffic to grow significantly. However, the infrastructure can naturally not facilitate unlimited volume, resulting in some limitation of the growth (Table 6.4, q. 8). With the release of Transvectio’s platform, an opportunity is presented to capture new clients transporting from Asia to Europe.

User’s familiarity and technology access

Transvectio’s platform will be website/application based so effectively all clients have access and will not need any specific knowledge or technology for utilization. It should be easy to navigate with resembling features from other similar websites/applications. Therefore, the accessibility of the platform is very high and it should be easy to navigate and utilize. However, that must be taken into account during development.

5.1.9 Application domains (markets) & Market formation

• Is the market accessible for introduction of new innovation/technology?

• How susceptible is the market to changes (e.g. technological/social) or introduction of new innovations?
• Is the market growing or shrinking?
• Is there a high number of competitors?
• Is the market competing with other markets? (e.g. different modes of the freight transport market)

**Market accessibility**

The freight transport business is known for being particularly cut-throat, operating with small margins and therefore not being the ideal protected space for frail and crude innovations (Table 6.4, q. 9). Numerous innovations have failed despite being promising and displaying decent initial testing results (Van Binsbergen et al., 2014). However, a difference can be identified in the adoption of digital versus physical innovations (Table 6.4, q. 9). As Hekkert et al. (2007) and Geels (2002) detail, there is the impact of the lock-in effect. Take an example of a new type of containers, e.g. one that can fold. This would save a lot of space when transporting empty containers, along with other benefits. However, the lock-in effect here is that carriers already have an abundance of containers. Investing in this new type would entail considerable sunk cost for carriers, unless the new containers can provide an added value beyond this sunk cost. The digital booking platform does not face this lock-in effect, as such a platform does not exist, to the best of the authors knowledge. Although, it does have to break into a market that utilizes other methods for booking freight transport. They are distributed, as each provider provides clients with their own method of booking, such as by contacting the provider directly. A digital innovation could have an easier time breaking into the market, given that it is financially viable or provides enough added value to offset the costs (Table 6.4, q. 9).

**Market growth and competition**

The rail transport market has the potential to grow, facilitated mainly by the Asian connection, as outlined previously. Within the EU, road transport still dominates other modes of transportation. In 2018 it was 75%, compared to 19% in rail (Eurostat, 2020). The EU has actively been attempting to make the shift from road to rail, inland waterways and short sea shipping (The European Union, 2011; Table 6.4, q. 5). To do so, they have set on foot numerous programmes and initiatives, such as the Horizons 2020 and its predecessors Marco Polo I and II (Table 6.4, q. 5). However, the latter have been deemed ineffective by EU auditors (The European Court of Auditors, 2013). Rail transport is furthermore competing with air and maritime, with each mode carrying pros and cons. While air transport is by far the fastest, it is also the most expensive. Maritime transport is the cheapest but has the longest transit times. With improvements in the New Silk Road infrastructure, rail transport becomes a very favourable mode of choice, with transit times being approximately a month and double that through sea. The competition is mainly based on the criteria of accessibility (e.g. shipping point location, additional services), availability (e.g. time-in-transit, frequency of departures/arrivals, capacity) and price. This criteria is evaluated by shippers when selecting mode and carrier. Usually, based on the shippers needs, a certain carrier is an apparent best choice, determined by the aforementioned criteria. As previously noted, Transvectio perceives that the direct competition, where carriers ship to the same location, is only about 10% of total rail transport through the terminal hub. If this is the case, stakeholders could be less likely to perceive the platform shifting business from them to competitors. Although, these 10% could represent a large portion of the total volume or stakeholder’s revenue. It is hard to determine if the market is saturated. If so, the introduction of the platform would solely shift business from one group
of stakeholders to others. Alternatively, it could provide everyone increased
business due to a growing customer base (Table 6.3, q. 11). Affecting this perception
is the Polish-Chinese connection. Poland has been strengthening their Chinese ties,
launching a direct freight train connection with China, at the end of 2019. Poland
could become China’s first point of contact with Europe, potentially clutching large
volumes of cargo from the terminal area and becoming the main hub for freight ser-
dvices and last-mile delivery. Loosing a large portion of potential Chinese customers
to Poland could have adverse effects on the growth and success of the platform.

5.1.10 Symbolic meaning of technology & Ethical concerns

- Is the innovation a symbol for wealth/status?
- Does the innovation alienate certain groups?
- Does the innovation offend certain individuals/groups?
- Is the innovation ethical and moral?
- Has the innovation potential to cause environmental or other types of dam-
age?

The innovation has no connection or references to any wealth or status signaling. No
more or less than booking transport through a website or a representative. More-
ever, the innovation does not alienate any groups or individuals. However, a close
look should be taken on the effect the introduction can have on employees. The
question arises if the platform could make certain jobs obsolete or drastically re-
duce their practicality.

In the digital age, a close look must be taken on the data collected from users. Pri-

vacy and security should also be considered during development of the innovation
and GDPR regulations should naturally be adhered to.

5.1.11 Infrastructure

- Is physical or virtual infrastructure needed?
- Are infrastructural changes needed (such as to introduce the innovation or
extract its full potential)?
- Is the current infrastructure suitable?
- Are the high costs of infrastructure changes/maintenance?

The infrastructure needed for the innovation is purely virtual, entirely online based.
There is significant development needed to create the platform but it can all be
performed in-house for Transvectio. Their IT department is experienced in the de-
velopment of platforms but might need additional staff if the goal is to launch the
platform quickly. The development environment, used to create the booking plat-
form, is well known and numerous contractors are available for hire if needed. The
operational costs are very hard to determine. The platform needs to be consistently
kept up-to-date and connection must be kept with cooperating stakeholder’s sys-

5.1.12 Industry structure & interests

• Is the development of the innovation reliant on a scarce resource, or one that fluctuates in price/availability?
• Are there legal barriers or limitations in the way for innovation introduction/development?
• Is there high availability of means for production of the innovation?
• Are there stakeholders with interests to protect (e.g. competitors that want to protect their market status).

Resource availability, means and limitations

The resources needed to develop the platform are purely financial, human and data-based. As previously noted, contractors for the development environment are easily acquired. To operate the platform, resources are needed from stakeholders in the form of data. The platform must be fed data from stakeholders to be able to display their connections and services. To provide and maintain a seamless connection and data-flow, the costs of manipulating data and connecting systems could be high for cooperating stakeholders (Table 6.4 q. 7; 6.3 q. 7). Furthermore, it must be taken considered that if stakeholders display all their information on the platform, they could feel they are giving up strategic information (Table 6.4, q. 12). It would be easy for opportunistic actors to utilize the information on the platform in mapping the connections and services of their competitors. Furthermore, the freight business being quote oriented, having a flexible price depending on the customer, cargo, destination and numerous other factors. As such, it is impractical to have prices displayed on the platform. This argument is further strengthened by the strategic reasons mentioned, where larger players could consistently underbid their competitors. As a result, it should be considered meticulously what features and services the platform should display and what data is needed from cooperating carriers.

Legal barriers or limitations

There are no apparent legal barriers or limitations standing in the way of the innovation’s adoption. Although, there are numerous stakeholders seen as viable cooperators, coming from several different countries. With terminal operations being within the EU, the legalities pertain to that area. Some players originate outside of the EU, but EU laws and limitations would still apply when exploring cooperation in the terminal area. It could be plausible that some challenges pertaining to competition law could surface if Transvectio fully retains ownership and control of the operational entity of the platform.

Stakeholder’s protection of interests

Due to being an important aspect, it should be restated. A large part of the success and growth of the platform is determined by the willingness of stakeholders to cooperate and join the platform. Therefore, ample focus should be on the perception of stakeholders towards the platform and the ideal opportunity to invite them to cooperate. Stakeholders can perceive the platform as being a threat, an opportunity or neutral. There are several situations and outcomes possible, the main one being if stakeholders, namely Oculus, carriers and other actors are willing to cooperate or not. Therefore, three possible options can be identified:

1) Stakeholders are willing to cooperate and offer their services on the platform
2) Stakeholders are unwilling to cooperate and see the platform as a threat to their
interests
(3) Stakeholders are unwilling to join but do not see the platform as a threat to their interests (e.g. due to minor or no competition)

Due to the low percentage of direct competition (10%), the amount of stakeholders seeing the platform as damaging to their business could be low. However, that is reliant on the amount of the total volume, revenue and strategic goals, as previously discussed. If so, stakeholders could be reluctant to cooperate, if they perceive that the platform could shift business away from them to competitors.

A key decision to be made is whether stakeholders should be approached for cooperation before or after initial release. The original idea, as stated in the previous chapter, was to release the platform initially, only containing Transvectio’s connections and services. Then reach out to other stakeholders for cooperation, allowing them to offer their connections and services on the platform. Several reasons are for stakeholders inclusion in the initial release. First, Transvectio has very low leverage during negotiations if the initial release of the platform fails to take flight. Second, to acquire sufficient exposure of the platform and making it known to new clients, extensive promotion and networking capabilities are required. This could be attained by cooperating with Oculus and other stakeholders, ideally making use of their networks. Third, if all negotiations fail, Transvectio could still move forward with the initial release as originally planned, containing only their connections and services. On the other hand, if the original initial release is very successful, Transvectio could have better leverage in negotiations.

Considering the stakeholders willing to cooperate, numerous incentives are in place. For example, if little to no downsides are of cooperating, such as for stakeholders that are in little to no direct competition. Additionally, if rail companies are also experiencing the effects of the hub’s exposure issue, they could see the platform as a much needed remedy.

Several factors have already been identified or theorized if stakeholder could be unwilling to join.
First, deciding on the level of neutrality the platform will possess. Will Transvectio connections/services be the first thing a client is presented with, when using the platform, or will everyone be promoted equally?
Second, if Transvectio will charge cooperating stakeholders commission fees for each booking made on the platform. If so, how large will this fee be?
Third, if the platform will (1) operate purely under Transvectio, (2) a joint venture, or (3) if an entity is formed, operating separately from Transvectio’s duties as a carrier and terminal operator.
Fourth, the data requirements needed to operate the platform. Cooperating stakeholders might be unwilling to share the large amounts of data needed to offer their services on the platform. This can be due to several reasons, such as fear of being strategically mapped by competitors, and high investment costs of manipulating data sets or systems to fit the platform (Table 6.3, q. 7; Table 6.4, q. 12). Therefore, it should be explored, what is the lowest amount of data needed from stakeholders, to ensure full functionality of the platform.
Finally, the level of liability. If issues arise with shipments made through the platform, can Transvectio as the platform owner be held accountable for mistakes or if all liability lies solely with the particular carrier (Table 6.4, q. 12). While these situations could be clear in some cases, these uncertainties have to be made explicit.
5.1.13 Policy & Decision making procedures

- Is the innovation adoption in-line with the organization’s (innovation developers/adopters) vision and the current in-house political climate?
- Are the are any specific government, local or global policies that can legitimize or aid the innovation adoption? (e.g. reducing fossil fuels, subsidies, tax exemptions)
- What is the public/private perception of the issue the innovation intends to solve/intervene?
- Political feasibility of the innovation?

Current in-house political climate

With regards to regime or in-house organizational culture at Transvectio, the current in-house political climate at Transvectio is balanced and no known large changes in vision or top management are taking place. Therefore, reducing the chance of large shifts in the long-term goals or visions of Transvectio, which is helpful, given the long and uncertain time frame of the project.

Potential aids in innovation adoption

As previously mentioned, The European Commission has initiated several programmes, aimed at shifting transport away from roads towards other modes. These have namely been the Marco Polo I and II projects, ranging from 2003 to 2013. This is done to reduce congestion, emissions, spark innovative activities amongst other things. The Horizons 2020 project, is the successor programme, although aimed more at green energy and environmental mobility solutions (Horizons, 2020). It could be possible that Transvectio’s project qualifies for a subsidy. Regardless, despite these modal shift programmes having been largely unsuccessful, according to EU auditors, there is an active push towards rail (and others modes) by decision-makers. This could be a beneficial aid to increase freight volumes in rail, but progress is very slow and ineffective.

5.1.14 Techno-scientific knowledge

- Is significant R&D needed for innovation development?
- Is there enough knowledge in-house or does it need to be outsourced?
- Is the knowledge niche or general (do many organizations have access to it?)
- Has this innovative endeavour been tried before?
- What was the success of previous tries? What can be learned?

Knowledge accessibility and previous innovation attempts

As mentioned previously, the project is currently being kept secret while early stages of development are being explored. While the platform entails significant resource usage, it is not nieche knowledge and can very plausibly be duplicated by opportunistic actors. Furthermore, research projects and pilots aiming to provide similar functions as the booking platform, have been attempted, such as Synchro-NET and Taubooker (Table 6.4, q. 2; Table 6.5, q. 2). Some of these pilots and projects, such as Synco-NET, are funded by Horizons 2020 (Synchro-NET, 2018; Table 6.4, q. 2). However, what the pilot and other research projects seem to lack is private interest and a clear direction facilitated by a project owner. Nonetheless,
considerable urgency is needed from Transvectio to refrain from sunk costs being put into their project if existing pilots take flight, becoming successful and widespread (Table 6.4, q. 3).

5.2 SUMMARY

As this section details, there are numerous factors that can hamper or aid the realization of the innovation project. Assuredly, some carry more importance and value than others, and therefore a summary is essential to outline the most important aspects. First, the success factors, those that provide an opportunity or edge in realizing a successful project are presented. Second, the failure factors, those that can impede the process of the project or result in its termination. Finally, several key decisions are identified that need to be made by project leaders. They are presented after the SFFs, in order to highlight their importance and make them explicit.
5.2.1 Success factors

The success factors identified in the chapter are presented below in table 5.1.

<table>
<thead>
<tr>
<th>Success factor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low direct competition</td>
<td>Despite a high number of carriers in the terminal area, the share of direct competition is quite low. Popular transport locations, such as large cities or other major hubs have several carriers offering transport, while some shipping points are offered by one or few carriers. The direct competition in rail transport, where carriers ship to the same location, is only about 10%. Nonetheless, this should be explored sufficiently and made explicit. The low percentage of direct competition decreases the chance and amount of stakeholders perceiving the platform as shifting business away from them to competitors.</td>
</tr>
<tr>
<td>The terminal area’s exposure issue</td>
<td>Transvectio’s perception is that clients are unaware of the advantages of using the terminal hub, as well as having issues finding information and suitable carriers. If stakeholders also perceive this exposure issue, they could see the platform as a much needed remedy for the hub.</td>
</tr>
<tr>
<td>Client growth</td>
<td>The increased growth of clients, facilitated by the Asia-Europe connection can be a vital enriching factor. This growth can subsequently reduce stakeholders fear of a saturated market, where the introduction of the platform would simply shift business from one stakeholder to the other. However, this success factor hinges on the growth of the bi-continenta connection, as well as capturing and maintaining these new clients.</td>
</tr>
</tbody>
</table>

Table 5.1: Summary of success factors for the innovative project

These factors present opportunities, which can aid the projects success. Transvectio should be aware of these factors and utilize them for their advantage.
5.2.2 Failure factors

The identified failure factors are presented below in table 5.2.

<table>
<thead>
<tr>
<th>Failure factor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial feasibility</td>
<td>The most important factor to consider is the financial feasibility of the platform. If the costs of developing and implementing the platform are much greater than the expected benefits, it becomes unfeasible to develop. A financial feasibility analysis needs to be undertaken to estimate the costs versus benefits.</td>
</tr>
<tr>
<td>Failing to cooperate</td>
<td>If all stakeholders refuse to cooperate, the platform would be limited to offer only Transvectio’s connections and services. While that could materialize to be a successful endeavour, it heavily limits the platform’s growth and potential.</td>
</tr>
<tr>
<td>Data sharing</td>
<td>Cooperating stakeholders might be unwilling to share the large amounts of data needed to offer their services on the platform. This can be due to several reasons, such as fear of being strategically mapped by competitors, and high investment costs of manipulating data sets or systems to fit the platform.</td>
</tr>
<tr>
<td>The Polish factor</td>
<td>With Poland strengthening their Chinese ties, they could become China’s first point of contact with Europe, potentially clutching large volumes of cargo from the terminal area. Loosing a large portion of potential Chinese customers to Poland could have detrimental effects on the growth and success of the platform.</td>
</tr>
<tr>
<td>Lack of urgency</td>
<td>Research projects and pilots aimed at providing similar functions as the booking platform, have been attempted, such as Synchro-NET, or are in development, such as Taubooker. These projects have lacked private interest and a clear direction facilitated by a project owner. They have been deemed, for now, unsuccessful. Nonetheless, considerable urgency is needed from Transvectio to refrain from sunk costs being put into their project if existing pilots take flight, becoming successful and widespread.</td>
</tr>
</tbody>
</table>

Table 5.2: Summary of failure factors for the innovative project

An additional soft failure factor can also be identified, relating to Transvectio’s cooperation reputation. They are deemed as being strict in cooperation and negotiations, which could deter stakeholders or reduce their patience for negotiations. However, this is a dynamic factor which Transvectio is aware of, allowing them to act more liberal when approaching stakeholders for cooperation. If these identified key identified failure factors materialize, it can effectively spell the end of the platform, or severely limit its growth and success. Alongside these factors are the barriers that the project faces, embodied in vital decisions that need to be made before moving forward with the development of the platform. It is crucial that these decisions are adequately explored, as poor decisions would likely only result in additional failure factors or barriers. These decisions are summarized in table 5.3.
Table 5.3: Summary of the identified decisions that need to be made

<table>
<thead>
<tr>
<th>Decision</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impartiality</td>
<td>Will Transvectio connections/services be the first thing a client is presented with, when using the platform, or will everyone be promoted equally?</td>
</tr>
<tr>
<td>Commission fees</td>
<td>If Transvectio will charge cooperating stakeholders commission fees, such as a subscription fee for being a part of the platform, or for each booking made. If so, how large will this fee be?</td>
</tr>
<tr>
<td>Liability</td>
<td>If issues arise with shipments made through the platform, can Transvectio as the platform owner be held accountable for mistakes or does all liability lies solely with the particular carrier.</td>
</tr>
<tr>
<td>Data requirements</td>
<td>As has been detailed, the platform needs stakeholder’s data to display their connections and services on the platform. Stakeholders will likely be sceptical about the data sharing requirements, which can deter them from joining the platform. Price display is coupled with this factor. Due to quote proclivity in freight transport and strategic reasons, it is unfeasible to display prices on the platform. An alternative would be to have clients request quotes through the platform. In an attempt to minimize this factor, it should be explored what is the lowest amount of data needed from stakeholders, while ensuring full functionality of the platform.</td>
</tr>
<tr>
<td>Resource usage</td>
<td>The amount of resources, Transvectio is willing to allocate for the project, must be determined. This is likely determined after performing a financial feasibility analysis, but should be explicitly explored.</td>
</tr>
<tr>
<td>Time frame</td>
<td>The speed of development and release has to be considered. This is an important factor to consider since speed is also linked to costs. A balance must be found between the resource usage and urgency.</td>
</tr>
</tbody>
</table>

5.3 THE CONTRAST BETWEEN THEORY AND REAL-LIFE

The analysis performed in the chapter attempts to capture several key SFFs the project faces. The inclusion of the partner selection process, coupled with the theory of social exchange attempts to highlight and analyse the nature of Transvectio’s relations with the arguably most important stakeholder, Oculus. An important aspect that social exchange theory manages to capture is the identified interdependent relationship that can be formed between Transvectio and Oculus, through the shared IT and networking capabilities, respectively. Transvectio having previously experienced a dependant relationship with Oculus, through their service agreement, are likely eager to refrain from one similar in nature. Identifying this common ground provides them with a sizeable opportunity to level the playing field in, being aware of the risks that follow. Nevertheless, several aspects are perceptible that highlight the difference between a theory based analysis and real-life applications, as the framework failed to capture all of the identified aspects. It also must be kept in mind that the analysis only provides an external view of the situation, from the view-point of an extrinsic researcher. This is particularly perceptible when attempting to gain insight into the key criteria of social exchange: trust, commitment and power. Without initiating negotiations with Oculus, only assumptions based on ar-
gumentation can be made. This also holds for other stakeholders that Transvectio
wishes to approach. While social exchange theory attempts to gain insight into the
relationships of rational agents, there are numerous other internal and external fac-
tors in real-life situations that can apply. The CIAF can act as a good starting point
to give the analyst a wide array of possible cooperation challenges or issues that
can occur, but human behaviour is hard or even impossible to accurately map.
To assess the identified SFFs, receive feedback and gather information on the project, experts in the field of freight transport and innovation activities were interviewed. This section details the nature of the interviews, how they were conducted and when, the qualifications of participants, and finally their opinions on the findings.

### 6.0.1 Interview structure

The interviews performed were structured in two ways. First, in order to gather information and sufficiently understand Transvectio’s project and their goals, informal interviews were undertaken with their representatives. The first informal interview was undertaken early in the process, during thesis proposal formulation. The researcher embarked on a field trip, along with Transvectio’s representatives, exploring Transvectio’s railway terminal and getting a first hand experience of its operations and inner workings. The representatives were Transvectio’s director of rail and their rail IT manager. Due to not having a clear direction for the research at that time, all questions and discussions were exploratory and informal. As the thesis materialized, regular informal interviews were undertaken with the director of rail. A total of five informal interviews were undertaken through video calls. These were performed in an iterative fashion, where a thesis draft was presented to the director of rail and he was asked to provide feedback. The same method was performed with Transvectio’s CIO, in a total of two iterations. The researcher asked leading questions and attempted to create a discussion, exchanging thoughts, opinions and extracting information. Due to COVID, some limitations were present. Originally, longer face-to-face meetings were expected, but resulted in being video calls, averaging around one hour maximum. Understandably, numerous pressing matters emerged as a results of COVID, so less attention was put on the project from Transvectio’s representatives than originally planned. Despite this limitation, the representatives provided as much information as possible and were always willing to schedule video calls and provide feedback. Finally, some of the questions might seem vague to the general reader, due to the protection of sensitive data. The participants were given all necessary information regarding the project, in order to provide their expertise.

A total of seven experts were contacted. Three of them were willing to participate. All of the interviews were conducted through video calls, due to the COVID virus. All interviews were recorded, although one of the recordings became corrupt, likely due to connection issues. Fortunately, the researcher took detailed notes during and after the interview. The participants were contacted through email, with the length of all interviews being one hour. Due to the time limit, not all aspects of the identified factors were able to be discussed, therefore the questions were made to be general but leading. Every participant completed the questionnaire. The interviews were semi-structured. A questionnaire was prepared before the interviews and the participants were asked the questions. The nature of the questions were formulated in a way to spark additional discourse for the identified SFFs. The participants were kept anonymous. A list of interviewed participant’s qualifications and the date of the interview can be found in 6.1. A full transcript of
the interviews can be found in Appendix B.1.

<table>
<thead>
<tr>
<th>Participant’s ID</th>
<th>Position (Institution)</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Professor of International Supply Chains and Ports</td>
<td>14/07/20</td>
</tr>
<tr>
<td>2</td>
<td>Professor in Freight and Logistics</td>
<td>17/07/20</td>
</tr>
<tr>
<td>3</td>
<td>Senior researcher in Transport</td>
<td>19/08/20</td>
</tr>
</tbody>
</table>

Table 6.1: List of interviewed participants, their qualifications and the date of the interview

The full list of questionnaire can be found in 6.2 below. All participants were presented with the same questionnaire to ensure consistency in the formulation of their answers.

<table>
<thead>
<tr>
<th>SFF Category &amp; Question ID</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Questions</strong></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>What do you think about the project overall?</td>
</tr>
<tr>
<td>2.</td>
<td>Have you heard about similar projects? (What was their success/failure?)</td>
</tr>
<tr>
<td>3.</td>
<td>Do you think the project requires urgency to start development or can it wait?</td>
</tr>
<tr>
<td>4.</td>
<td>The terminal area is seemingly experiencing an exposure problem. Are you familiar with this issue?</td>
</tr>
<tr>
<td><strong>Landscape developments</strong></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Do you know about any large developments or emerging changes in the freight industry that could affect the project?</td>
</tr>
<tr>
<td>6.</td>
<td>Do you think COVID will have any detrimental long-term effects on the rail freight market?</td>
</tr>
<tr>
<td><strong>Tech. char. and Resources</strong></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Do you expect the development of the platform to be resource costly?</td>
</tr>
<tr>
<td><strong>Public perception</strong></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Do you expect the Asian-Europe two-way trade to grow in the following years?</td>
</tr>
<tr>
<td><strong>Application domains</strong></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Do you think the freight transport market, and specifically rail transport is open to new and emerging innovations?</td>
</tr>
<tr>
<td><strong>Ethical concerns</strong></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Can you think of any ethical or moral concerns the development of the booking platform might have?</td>
</tr>
<tr>
<td><strong>Industry structure</strong></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Do you think attempting to cooperate with Oculus and other carriers, before the initial release, is the best approach to combat the exposure issue?</td>
</tr>
<tr>
<td>12.</td>
<td>Can you think of any additional factors that Transvectio, Oculus and cooperating carriers would have settle on, when negotiating their platform involvement?</td>
</tr>
<tr>
<td>13.</td>
<td>In your opinion, are there any stakeholders that are absolutely vital to have on board, willing to cooperate?</td>
</tr>
<tr>
<td>14.</td>
<td>What is you opinion on the three possible approaches of A. having the platform operations as a part of Transvectio. B. Forming a joint venture with cooperating stakeholders or C. Forming a separate Transvectio entity with a dedicated team that handles the platform operations?</td>
</tr>
<tr>
<td>15.</td>
<td>In your opinion, what is the greatest hurdle in realizing a successful project?</td>
</tr>
</tbody>
</table>

Table 6.2: List of interview questions for each success and failure category

The relevant information gathered from the interviews was then added to the identification of the success and failure factor chapter. To make it explicit what information was gathered from the participants, tables 6.3, 6.4 & 6.5 are presented. The previous chapter (5) references these tables to make it explicit where the
used information comes from. The tables include a summary of the relevant information, extracted from the respective participant. If any information from the participants answers were added to the success and failure chapter, the question ID is highlighted. Note that not all information gathered in the interviews was new information. Some information or arguments had already been gathered by the researcher.

<table>
<thead>
<tr>
<th>Question ID</th>
<th>Information</th>
<th>Participant 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.</td>
<td>Volumes are naturally reducing due to COVID, but it has also accelerated a few things, such as e-commerce and issues in the retail sector. It has postponed sales on commodities such as automobiles but in the end, at some point sales are going to return to normal.</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Yes, previous initiatives that have failed, or working on a very low profile, have numerous issues and resources is one of them. Companies need to connect to the platform and it is not just a matter of plugging in and it works. Systems need to be changed and you have to hire employees to do so. It is also the maintenance. To summarize, the development of the platform costs money but furthermore the connections with other companies and maintaining those connections.</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Yes, it is expected to grow. Other port authorities are also involved in projects that explore this new trade route and how it connects with existing networks. There are initiatives that are aimed at exploring this new connection and its growth.</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>One of the emerging technologies that are being explored is blockchain, and making digital connectivity next to physical connectivity. Some players in the freight industry still use ancient technologies, such as Telex, so some might be slow at adapting. Blockchain could be the solar-power of the communications channel, due to not being locked-in from previous infrastructure. The new de-centralized technologies can have an advantage of not relying on this existing infrastructure. Some pilots are being undertaken on blockchain, and a few international shipping lines have joined the effort.</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Yes. A lot hinges on collaboration with stakeholders. The platform is subject to network effect, only if you have stakeholders joining the platform, does it really become effective. If too many will boycott the platform, it fails to become successful. What is also important is the market shifts the platform might have. Those kinds of shifts, how will the platform actually impact the market, will it shift, will it grow business? That will actually determine how rail companies look into that. It has to be taken into account that stakeholders might not be willing to collaborate if they expect to loose business from joining the platform. The question then becomes “What level of cooperation is possible with competitors and what would be the role of port authorities in that?” It is only that if it is believed that the platform could grow the business to such an extent that competition between players is not significant, and there is mutual benefit for everybody. It also depends on historical developments. If an overall growth occurs, it can reduce the fierce competition and make players more open for collaboration. Due to Transvectio operating as both a carrier, terminal operator and would be platform operator, they are in a sensitive position.</td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>The neutral platform makes a lot of sense, otherwise if the owner of the platform is also a participant in the market its going to be very difficult. At least it should be a joint venture between the parties, but you can also have companies attempting to take the idea and making their own platform. You have alliances that can share the capacity and similar things will happen with the platform, it might not be legal to do that, regulations would have to be checked.</td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>The platform needs a clear goal or value. It has to have value proposition for its users.</td>
<td></td>
</tr>
</tbody>
</table>

Table 6.3: Summary of the relevant answers to the interview questions, given by participant 1
<table>
<thead>
<tr>
<th>Question ID</th>
<th>Information</th>
<th>Participant 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Similar projects have already been undertaken, such as Synchro-NET. Many of them, including Synchro-NET, were financed by the Horizon 2020 EU subsidy project. These projects have often lacked private interest and are more academic or research based in nature. The lack of private interest, coupled with no real project or problem owner might have been one of the reasons why these pilots never took any real flight.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Yes, urgency is needed due to the aforementioned reasons, relating to the pilot projects performing similar functions as the booking platform.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>There are several large ongoing developments that might affect rail transport. The EU aims at shifting freight transport from road to rail. Although, the European Court of Auditors have concluded with their report that the EU is failing to reach that goal of modal shift despite high investments in high speed rail. Projects have been undertaken by the EU to promote this goal, such as the Marco Polo policy, the Horizons 2020 project and the Connecting Europe Facility (CEF). Additionally, carriers are exploring synchromodality which keeps the choice of mode flexible, which could affect railway transport.</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>No expectation of long-term effects but in terms of the supply chain of shippers, the bullwhip effect could come into play, affecting the rate and quantity of transport, making it more volatile.</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>There will likely be an issue of connecting carriers to the platform. The carriers have different systems and information needs to be kept constantly up to date. Some investment is very likely needed to ensure this connections is attained and maintained.</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Yes, I expect it to grow but at some point the amount of transported volume will be limited due to the infrastructure. The tracks are limited to carry a finite amount of volume so if cargo starts to get delayed or simply can not fit on trains due to this limitation, the rest has to go through other modes such as ships.</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>No, in general the freight market is very crude and cut-throat and does not provide the safe-space new innovations need when emerging. This has usually been the case with physical innovations, such as folding containers. However, the platform has the advantage of being virtual rather than physical so it could bypass some of the issues innovations have. The market is more open to virtual innovations rather than physical ones, but it also hinges on the added value or benefits of the innovation versus the costs.</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>There are several factors that have to be decided upon or explored. One is the information the carriers are providing to the platform. They are essentially forced to give up information about their whole network to be able to offer their connections and services on the platform. This is something the carriers might not be willing to. Another is where the liability should lie. If changes, mistakes or cancellations take place, will the liability lie with Transvectio as the platform operator, forcing them to pay reparations, or will the liability always lie on the carrier?</td>
<td></td>
</tr>
</tbody>
</table>

Table 6.4: Summary of the relevant answers to the interview questions, given by participant 2.
Question ID | Information | Participant 3
--- | --- | ---
2. | Similar projects have been undertaken but have been, for now, unsuccessful. Taubooker is one of those projects and tries to fill empty spots on barges. |  
3. | Uncertain. It is hard to predict the correct timing for such a project. However, the correct timing is not a large factor, it is rather other challenges the project is faced with, in large being the financial feasibility. |  
6. | There is the chance of demand in the world going down according to the death rate. If a vaccine or a medicine takes time to be developed, and the world is unable to manage the virus, there could be a large death toll. |  
7. | It should be expected that the development of the platform will be resource costly. It is also not only the development of the platform itself, but also setting up connections with other stakeholder’s systems and maintaining those connections. |  
8. | The Chinese want the trade to grow so they will make it happen. |  
9. | It is quite open to innovations but it is very challenging to innovate effectively. The rail freight sector is very capital intensive, with very long lasting lifetimes. The question has to be asked of “Who is going to buy the innovation and for what reason?” That aspect is often insufficiently explored. The benefits of the innovation have to outweigh the costs for it to be financially feasible to invest in it. |  
11. | The success of the cooperation is doubtful. It could work but it should not be forced, but rather be an attractive option for stakeholders, similar to Uber or Thuisbezorgd (a food delivery platform in the Netherlands). If cooperation is needed, compromises are also needed and that might not work out. Several issues are apparent and lengthy discussions will be undertaken with regards to division of benefits, investment costs, data sharing and more. These phases have also occurred for other pilots, such as Taubooker, and have not been able to become a success. |  
12. | What you regularly see with companies is that they are not very willing to share data. Additional, there are other challenges, such as the division of benefits and costs and if investments need to be made. In principle, everything could be displayed on the platform but in practice, companies would likely highly prefer to display as little as possible, this is a balancing act that needs to be addressed. The platform needs to be very to the point, transporting from A to B, under these specific conditions, these are the suppliers and these are the prices. |  
13. | Ideally, to have all of them willing to cooperate would be the best choice. It is hard to determine which stakeholders would be the best choice, with so many decision variables. There are several challenges with the cooperation so getting anyone on board should be considered very positive. |  
14. | It should be a separate entity. By keeping it in-house it can tangled up into all kinds of politics. To maximize the chances of success, it should be a separate entity. |  
15. | It is by far financial issues. The costs of making these systems are ignored and the costs of connecting the companies to the platform are ignored. These costs can be expected to be significant or even very large. Running and maintaining the platform also costs resources. The financial feasibility of the project must be apparent. |  

Table 6.5: Summary of the relevant answers to the interview questions, given by participant 3

During the thesis development, the iterative process of receiving additional information through feedback from Transvectio’s representatives, coupled with the interviews, lead to the strengthening of the success and failure chapter. It allowed the identification of the SFFs to progress immensely. Taking a step back and comparing the first interview to the final one, the number of arguments identified were naturally highest in the first one. Without dismissing any of the participants contributions, the final interview provided the least amount of new arguments. However, the final interview was also performed over a month later, compared to the first, allowing sufficient time for feedback, amendments and the structure of a coherent success and failure chapter. The final interview produced good arguments and information. From the researcher’s perspective, the participants
had different viewpoints on the feasibility of the project. Without including the emotional loading of the words, the best way to describe the participants views would be optimism, pessimism and realism. The researcher expected this view to affect the arguments made, but interestingly, similar arguments were usually made.

Due to the structure of the interviews, coupled with changing information, some difficulties are presented when counting the number of new arguments from the first interview to the final one. The summarized discourse presented in tables 6.3, 6.4, 6.5 are used to count the number of arguments. The first interview presents eight new arguments. The second presents four and the third one four additional ones. The number of arguments that the participants all mentioned or had the same view upon were six.
This thesis set out to create a cooperative focused framework that identifies the SFFs of a cooperative innovation project, presented in the main research question: *What are the success and failure factors of a cooperative innovation project, identified with the aid of a framework, incorporating cooperative aspects.* To reach an answer to the main research question, frameworks and theories found in the literature were utilized to create a framework, coined the Cooperative Innovation Analysis Framework (CIAF). Transvectio’s innovation project was applied to the CIAF to assess the efficacy of the framework and to identify the SFFs of the project. Additional data was collected and findings evaluated through interviews with Transvectio’s representatives and experts in the field of innovations and/or freight transport. This thesis has exhibited the identification of SFFs of a cooperative innovation project, with the aid of the CIAF, reaching a conclusion to the research question. However, due to the research question being more akin to a process, rather than a closed question, the efficacy of this process can be debated and is done below.

A discussion is undertaken in the next section to assess the work performed, addressing the third sub-question, and critically evaluate the thesis. This chapter is concluded with suggestions for Transvectio’s next steps and recommendations for further research.

### 7.0.1 Discussion

The approach chosen in this thesis provided an answer to the main research question. Note that the wording of “an answer” is done deliberately. This is to highlight that despite an answer being reached, a different researcher facing the same question is sure to reach a non-identical conclusion. This is due to the research question being a process, rather than a closed one. This can be embodied with the saying: “The measurement is only as accurate as the tool you use”. In other words, the theory behind the modus operandi, resulting in the formulation of the framework, is what ultimately decides the quality and efficacy of the subsequent analysis. The theory selection and its subsequent linking in the framework is not free from criticism. With Transvectio’s case being used as a reference to formulate the framework, it is inevitably colored by the project’s characteristics. Nonetheless, considerable attempt was made to make the framework general, to be applicable for a wider variety of cooperative innovation endeavours. For that reason, the framework exhibits a classical top-down approach. The thought process is along the lines of: (1) Projects relying on cooperation will involve partners, so a partner selection can be advantageous. (2) They can have conflicting interests and perceptions so analysing their interactions and relationship outcomes can reduce the likelihood of sub-par alliances. (3) The innovation’s challenges and SFFs need to be identified. (4) Selecting several frameworks with a variety of factors can aid to identify a wide range of potential challenges. This can be compared to fishing in a lake. To catch as many as possible, throw out the largest net you can find. While this can be effective, there is no guarantee it will be. What could be more effective is studying the behaviour of the fish, the ideal bait and fishing spots. To put this into perspective of the framework, a bottom-up or an evolutionary
approach could be more fruitful. How that would be formulated and especially generalized is hard to pinpoint. Innovation projects are very heterogeneous with different challenges and considerations to be evaluated at each time. A framework with a bottom-up approach to capture this heterogeneity would be very hard to formulate. Although, different formulations of the framework can be explored. A flexible ordering of the framework’s building-blocks, such as performing the partner selection last could potentially produce different results. However, due to the lack of explicit connection between the two segments, similar results are likely to surface. Swapping out theories could also produce contrasting findings. Theorizing if a bottom-up approach could be more beneficial highlights the difficulty of generalization. Some idea can be gained through the application case. The analysis of Transvectio’s case identified several challenges and produced key SFFs. It can not be said for certain that the framework identified all possible factors, as it is far from being exhaustive. If the project progresses and is put into motion, an ex-post analysis could exhibit the efficacy of the framework. How well it managed to identify the real-life challenges that emerge. Even if the framework performed well, it cannot be claimed that it is general enough to be effective for a wide variety of projects. Additional projects would have to be applied to the framework ex-ante and evaluated ex-post.

It should be noted that the innovation literature selected was more concentrated on exploring the possible break-through of innovations into their embedded systems. They rather view this break-through of innovations as a “how they could”, rather than “how they should”, albeit Hekkert et al.’s framework is more akin to the latter. The CIAF then transforms these facets into a more practical approach, amalgamating them to form a unity. Despite the CIAF consisting of this wide array of factors to consider when analysing the project, it did not manage to capture all of the findings presented. Through the expert interviews and iterative feedback from Transvectio’s representatives, additional factors and findings became evident. Arguably, failing to identify these factors and arguments could denote a shortcoming of the CIAF. Even so, one should consider if it is feasible to adequately identify and analyse all possible factors that could materialize, through a framework. It should be accentuated that the CIAF can not identify all possible factors or hurdles than can occur. But as discussed previously, this can only be confirmed through an ex-post analysis if the project progresses. The CIAF’s focus on innovative endeavours conducted in the private sector could be regarded as a deficiency. With Transvectio’s project being purely private sector based, the choice was made to cater to it. Conceivably, public sector elements could have been integrated into the CIAF from Feitelson and Salomon’s political economy model. Although, that would naturally entail that those elements could not be tested, given that Transvectio’s project does not include them. The interviews with experts provided a valuable second-hand perspective on the identified factors. In hindsight, the questionnaire could have been formed in a more structured way, to better direct and control the discussion. In some cases, participants were inadequately prepared, and given the short amount of time available for each interview, valuable time sometimes went into discourse unrelated to the topic at hand. Finding a fourth participant could have strengthened the findings. Although, the three interviews performed, coupled with the iterative feedback process with Transvectio’s representatives was determined sufficient. Achieving both an internal and external perspective on the findings, from Transvectio’s representatives and experts respectively, also proved very valuable. This approach provided findings that the CIAF failed to capture.

1 Note that despite the framework now ironically being “bottom-up”, this is not being used as an example of a bottom-up approach. This is only to give thought to the ordering of the framework, and how the chronological order of the building-blocks could affect the analysis
The third and final sub-question formulated stated: "How can the findings be used to aid future projects to analyse the success and failure factors in similar projects?". The chosen approach to answer the sub-question was to interpret the findings of previous sub-questions in an attempt to: (1) Aid future innovative efforts, relying on cooperation, realize their projects. (2) Close the gap of knowledge in the literature. (3) Give Transvectio a well-formulated analysis of the potential SFFs they might encounter, in order to aid them in realizing a successful project and attempting to extract the available potential the project can provide for them and key stakeholders.

First, future innovative efforts, relying on cooperation for success, could possibly be faced with similar challenges as identified in this thesis. The challenges faced when attempting to cooperate can be exceptionally dynamic, but hopefully this thesis can be a starting point in addressing some of these challenges. The CIAF can provide a good starting point for firms or entrepreneurs engaging in innovative efforts, aiding them in identifying the numerous SFFs that can emerge. Nonetheless, it must be kept in mind that the CIAF acts as a wide-angle lens, in an attempt to capture a broad range of challenges and considerations. Nonetheless, the effectiveness of the framework can not be confirmed unless tested with additional cases.

Second, the gap of knowledge, identified in the beginning of this thesis, highlighted the lack of focus on cooperation in innovation studies. While this thesis tackled the issue and sought ways to reduce this gap, a single piece of literature is not sufficient to address the issue. With advancements in digital solutions, providing increased connectivity and networking options, cooperation becomes ever more viable and important for advancement. Hopefully, this thesis can inspire current and future academics in the discipline of innovation studies, or any discipline for that matter. Increased research can aid to shine light on the issue and generate valuable literature aimed at further bridging this gap.

The third and final point has been provided with the analysis performed and subsequent findings in chapter 5. However, in order to extract the potential the project currently has to offer, Transvectio’s first approach to the project and the succeeding next steps have to be carefully and meticulously taken. To aid Transvectio in this venture, the next section provides suggestions how this should be done.

### 7.1 NEXT STEPS

#### 7.1.1 Suggested next steps for Transvectio

At the moment of writing this thesis, no action has been undertaken in starting developments on Transvectio’s project. With several SFFs, coupled with key decisions that need to be made, the question arises what should be the first step towards realization. The first step is often the hardest, therefore to aid Transvectio, the author presents a short summary of the suggested first steps.

1. Further explore data and findings. While not attempting to undermine the authors or other participant’s claims or findings, it is important to sufficiently determine that all findings and information present is factual. The author has limited experience in freight transport and its market structure, perceiving the project externally with an observational lens. There are several important factors that can severely affect the realization of the project. The main factors being the expected Chinese freight growth, the expectation of low direct competition and the Polish-Chinese ties. The analysis only expressed these factors to be a potential challenge. The actual scale of these challenges is still left unanswered and should be explored in more detail.
2. Make decisions. The identified key decisions, identified in Table 5.3 should be evaluated and decided upon. These decisions will affect several aspects, such as stakeholders perception towards cooperation, costs and speed of progress. Some of them need to be made before approaching stakeholders so they should be explored early on.

3. Perform a financial feasibility analysis for the project. The project is not viable unless the benefits exceed the costs. This analysis should naturally also include the IT costs of the platform development, and ideally the costs of connecting cooperating stakeholder’s systems to the platform.

4. Approach Oculus. Oculus’s networking capabilities can aid the project immensely. Having them on-board would also help to reduce tensions in their relationship with Transvectio and possibly attract other stakeholders in the area. Therefore, approaching them and explore their perception towards cooperation should be performed early on. Preferably, development would be started by this point. Additionally, measures should be taken to protect the innovation from being stolen.

5. Approach other stakeholders. Unconditional on the success of negotiations with Oculus, other stakeholders should be approached. Suitable initial candidates could be those that have previous ties with Transvectio. Measures should also be taken to protect the innovation.

6. The subsequent steps hinge on the success of the previous ones. In the case of a successful cooperation with Oculus and other stakeholders, development can be continued and the platform eventually released. Unsuccessful cooperation with Oculus and other stakeholders limit the innovation severely, likely only allowing Transvectio to offer their own connections and services on the platform. The same circumstance occurs if Transvectio is unsuccessful in cooperating with other stakeholders.

7.1.2 Recommendations for future research

The characteristics of the project, coupled with the SFF analysis, highlights the complex nature of the relationships between the actors in the terminal area. The project’s success is largely determined by the results of cooperation. Failing to cooperate severely limits the envisioned goal, resulting in the focus being put on how to facilitate cooperation. Pinpointing the types of cooperative relationships can aid in facilitating them, resulting in the exploration of these different types. Doing so reveals a complex but an interesting dynamic. When attempting to categorize the project’s stakeholders into the four types of relationships that can develop between competitors: coexistence, cooperation, competition and coopetition, it becomes complicated. From Transvectio’s perspective, the company competes with the carriers and terminals that offer the same services and connections they do, while co-existing with those that do not. When engaging stakeholders to cooperate and join the booking platform, this categorization becomes even more complicated, blurring the lines between the four types. Transvectio as a freight facilitator competes and co-exists with the stakeholders, while as a booking platform operator, they cooperate and even co-opete, depending on the stakeholder. While Transvectio might aim to separate their operations as a freight transport facilitator and as a booking platform operator, through the creation of a separate entity, this tension is still present from the perspectives of potential cooperating stakeholders. This can be further complicated with changing conditions. Changes in stakeholder’s market focus, introduction of new connections and services and new players in the market can all affect and shift the relationship dynamic. Despite appreciable literature on these different types of relationships, less is written about relationships where the
types intersect or become more dynamic, such as in Transvectio’s case. Conceivably, there might be insufficient interest in this particular discipline. Alternatively, this situation might be so rare or case specific that it has not caught the attention of academics or other scholars. Nonetheless, a new type of relationship could possibly be identified, one that manages to capture the tensions of this dynamic intersection of the four types of relationships. For scholars, this project, or others like it, could be an interesting starting point to research this phenomena. As previously noted, there was a lack of connection between the cooperation and innovation segments of the CIAF. This is a downside of the framework, as cooperation can affect the requirements of the innovation. Bridging this gap between the segments could be a good starting point to improve the framework. This second iteration of the CIAF could then also be applied to Transvectio’s case and the analysis compared to the first one. Finally, recommendations to facilitate cooperation between stakeholders facing these problems could be extended, building on the work performed in this thesis. With ever increasing globalization, both private and public stakeholders have to rely on cooperation to progress and succeed. Furthermore, innovation is a cornerstone in progressing technology and society as a whole. Findings ways to bridge these two forces become increasingly more vital. This thesis might only be a droplet in the face of the pillar blocking this bridge, but with persistence, the drop of water hollows out the stone.
BIBLIOGRAPHY


The European Union (2011). Roadmap to a single european transport area – towards a competitive and resource efficient transport system.


A scientific paper of the conducted thesis is annexed to this first part of the appendix. For formatting purposes, this paper has a different structure than the previous chapter and the rest of the document. The remainder of this page is therefore intentionally left blank. The scientific paper can be found on the next page.
Analysis of the success and failure factors of a platform-based innovation project through a cooperation focused framework

Abstract
The digital world allows for increased levels of innovative activity as well as cooperation, through the increased networking it provides. Innovations have often been the subject of academic literature, where scholars attempt to identify the success and failure factors of innovative endeavours. A review of the contemporary literature has highlighted a knowledge gap in innovation studies. Although academics in innovations literature often agree that the salience of stakeholders is a very important factor, the challenges associated with cooperation are hardly ever identified or made explicit. This gap in the literature is one this paper attempts to bridge, by formulating a cooperation focused framework, in order to identify success and failure factors of innovative endeavours. To assess the efficacy of the framework, a case is applied. It is an innovative booking platform project in rail freight transport that relies on cooperation between stakeholders. The framework is used to identify the project’s success and failure factors. The framework identifies the key success and failure factors, relating to the cooperation and the innovation itself. Future research recommendations are made for increased focus on cooperation in innovation literature.

Keywords: Innovation - Cooperation - Freight Transport - Success and Failure Factors - Framework

1 INTRODUCTION
In an ever interconnected world, connectivity and networking through digital solutions become more frequent. Numerous opportunities to innovate can be identified alongside this growth, with some of the most successful ones being platform based, facilitating social networking, home delivery, and multitudes of other services. These solutions have also caught the attention of players in the freight industry, with perhaps the latest endeavour being pursued by Transvectio, a freight transportation company. They are engaging in an innovative project, aimed at developing a booking platform which allows clients to book rail freight transportation, request pre- and post carriage, plug-in, customs assistance and other additional services. The platform also provides management for documents and more importantly conveys all the necessary information in one place.

The project entails grand opportunities to capture the expected increase in freight volumes, facilitated mainly by a connection with Asia. Transvectio is looking to cooperate with the stakeholders in their area of operations, allowing them to offer their connections and services on the platform as well. The growth and reach of the platform hinges on successful cooperation, with one of the main players being the terminal area operator, Oculus. Their networking and connection capabilities could strengthen the platform immensely, aimed at becoming the first point of contact for clients when utilizing the terminal hub. However, the road to success is paved with grand challenges, consisting in large of the difficulties of cooperation. Significant attention and effort needs to be put into facilitating this cooperation, as potential stakeholders are faced with several uncertainties. Transvectio needs to be aware of how stakeholders perceive their inclusion in the platform, since they are not a neutral party, operating as a carrier and now a platform operator. The right selection of partners can play an important role, where the cooperative challenges could be more difficult to solve for stakeholders operating in a very competitive market segment. If partners perceive that cooperating results in Transvectio receiving excessive benefits or increasing their competitive advantage, they might refuse to join and persuade other companies to do the same, to maintain their current market status. The same could occur if they perceive the platform to be shifting clients away from them to
competitors. In turn, the platform would fail to receive the necessary exposure and accretion. The dynamic of the alliance and the partner’s relationships needs be identified and formed in a meticulous way.

Substantial literature has emerged the past 20 years that attempts to identify the factors, that lead to success and failures to innovative efforts (Van der Panne et al., 2003). Van der Panne et al. (2003) conducted a literature review of 43 innovations in an attempt to discover recurrent factors regarding successful or unsuccessful realizations. Despite some studies finding certain factors being vital for success, other studies claim that a very different set of factors are crucial, while ignoring the previous. The causal links also varied between studies. Van der Panne et al.’s conjecture is that the difference in analysis methods, the diversity of samples and self-serving biases all affect this variance in interpretations. Therefore, while certainly some similarities could be found in previously conducted innovative efforts, the heterogeneity of innovations and external factors make each project unique. Furthermore, scholars have attempted to identify the SFFs of private and public projects (Van Wee, 2003; Van den Bergh et al., 2007; De Jong et al., 2013), such as by creating frameworks to aid with the analysis (Feitelson and Salomon, 2004; Hekkert et al., 2007; Geels, 2002). Despite willingness by stakeholders to realize inventions, they often fail due to numerous factors. Cooperation between stakeholders engaging in innovative projects is frequently addressed as a vital factor for project success in the literature (Bontekoning and Priemus, 2010; Van der Panne et al., 2003). Lack of cooperation can inhibit project success (Arvidsson and Browne, 2013) and should be undertaken early in the project (Arduino et al., 2013). The importance of cooperation between stakeholders is well grounded in the literature, with academics attempting to develop theories and frameworks why and how firms should cooperate. Bengtsson et al., (2003; p. 5) put forward the proposition that “The decision to cooperate or compete with a competitor is depending on the lack of or access to unique capabilities and/or resources“. However, this unique capability is not always clear-cut, and even if so, lack of trust, fairness, power imbalances and other aspects can hamper cooperative efforts between stakeholders. Despite academics in innovations literature often agreeing that the salience of stakeholders is a very important factor, the challenges associated with cooperation are not given enough focus. This gap in the literature is one this paper attempts to bridge. Innovative projects would benefit from an SFF analysis and identification of the challenges relating to cooperation. This includes the right partner selection, the dependence formed between the stakeholders and their level of trust, power, reciprocity and commitment towards the cooperative efforts. Formulating a framework, which incorporates the aforementioned aspects could aid future scholars or entrepreneurs analyse and possibly realize innovative efforts, relying on cooperation. Subsequently, this framework could be assessed by applying it to Transvectio’s innovative endeavour.

No framework currently exists in the literature, which attempts to incorporate an identification of success and failure factors (SFFs), coupled with aspects that identify challenges of cooperation. This leads to the formulation of the research question: What are the success and failure factors of a cooperative innovation project, identified with the aid of a framework, incorporating cooperative aspects.

This paper is structured as follows: First, a method section is undertaken, presenting a literature review performed to show how the aforementioned knowledge gap is identified, coupled with the research approach. Second, the framework is formulated and presented. Third, Transvectio’s project is applied to the framework to assess it and identify the SFFs of the project. Finally concluding with a discussion and recommendations for future research.

2 METHODS

This chapter presents the literature review, used to formulate the knowledge gap, and the chosen research approach, aimed at the main research question.

3 LITERATURE REVIEW

This section shows the process of the literature selection used to formulate the knowledge gap. First, the search strategy for identifying literature is presented. Then the exclusion criteria for the selection of literature is detailed and visualized with a Prisma flow diagram. The selected literature is presented in an overview table and the contents and findings of the papers are discussed.

3.1 Literature selection

3.1.1 Search strategy

An abundance of literature is available on innovations, identifying SFFs, with both ex-ante and ex-post evaluations, using multiple analysis techniques such as frameworks and Multi-Criteria Decision-Making methods (Van den Bergh et al., 2007; Ghaffari et al., 2017). To scour the available literature, keywords were formulated from the problem statement. The keywords were the following: “innovation”, “success and failure factors”, “cooperation”, “freight transport” and “railway”. The inclusion of the last two keywords was to narrow the search and focus on the specific sector the innova-
tion will be applied to. Rail is also different to other modes of transport. The pros and cons of rail create a distinct dynamic, such as being faster than other land based transport options but with more limited accessibility. Using the keywords, the following search string was crafted:

\[
\text{innovation AND ("success and failure factors" OR "success and failure" OR "SFF") AND ("freight transport" AND railway) AND (cooperation OR collaboration)}
\]

3.1.2 Exclusion criteria

The literature databases, Scopus, Research Gate and Google Scholar were used to conduct the search. To exhaust the search, title, abstract, keywords and text were searched for a match. Snowballing, when promising literature is identified through the citations and references of promising papers, proved very useful. Articles behind a paywall or those who were not immediately available were excluded. Only articles, journals, papers and literature reviews in English were considered. Innovation literature, identifying SFFs with the aid of frameworks and other techniques, has mostly emerged the past two decades. Therefore, due to the profusion of search results, literature before 2000 was excluded in the search. Note that if certain literature were considered to be a corner-stone or very prominent, it was included, despite falling under the exclusion criteria. Also if identified with methods such as snowballing. A Prisma flow diagram is presented in Figure 1, to visualize the assessment process and literature exclusion criteria (Moher et al., 2009).

3.2 Literature review findings

A literature overview table is visualized in Table 2. It presents in a structured way how the selected literature conducted their research and their relevant contents. From the plethora of available innovation literature, 15 papers have been selected and reviewed based on four aspects: The analysis techniques used to identify SFFs, the field of study, if the importance of stakeholders has been addressed and finally the emphasis on cooperation or collaboration between stakeholders. The third and fourth aspects are vital factors in realizing a successful project in the Transvectio case, where the management of stakeholders and their cooperation is vital. The main focus when reviewing the literature was on the salience of these aspects. Furthermore, an attempt was made to select papers related to freight transport, specifically through rail, although other fields also included construction (Widén et al., 2014; Faried and Saad, 2017), ICT (Idota et al., 2010) and maritime innovations (Ballis and Stathiopoulos, 2003; Arduino et al., 2013).

As the literature overview table visualizes, numerous analysis techniques are used to identify SFF’s. Subject to the heterogeneity of innovation projects, the identified techniques produce both argumentative quantitative and qualitative results. Although, there seems to be no consensus in the literature which technique is superior.

3.3 Salience of stakeholders

From the reviewed literature, eight addressed the salience of stakeholders, how important to the project the inclusion and focus towards stakeholders were. Despite varying focus on stakeholders in the innovation process, the involvement of stakeholders was: Considered an important factor (Bontekoning and Priemus, 2010; Visser et al., 2008; Arduino et al., 2013; Mueller and Blanquart, 2014; Wiegmans et al., 2007), used as an evaluation factor of a successful innovation (Van den Bergh et al., 2007), and determined a barrier due to conflicting objectives (Arvidsson and Browne, 2013). Widén et al. (2014) conducted an empirical research to study the link between successful innovation diffusion and key stakeholder engagement. Their results show a significant correlation between the two and recommend stakeholder inclusion early on in the innovation process.
<table>
<thead>
<tr>
<th>Literature</th>
<th>Analysis technique to identify SFRs</th>
<th>Field</th>
<th>Salience of stakeholders addressed?</th>
<th>Emphasis on cooperation or collaboration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mueller &amp; Banwart (2014)</td>
<td>Interviews</td>
<td>Freight transportation</td>
<td>Considered a determining factor (the necessary involvement of all the actors of the chain)</td>
<td>Cooperation can foster innovative efforts but not explicitly mentioned as a success factor</td>
</tr>
<tr>
<td>Ghaifai et al. (2015)</td>
<td>Best-worst method (MCDA)</td>
<td>Technological innovation in aerospace</td>
<td>No</td>
<td>Cooperation deemed as one of the most important success factors</td>
</tr>
<tr>
<td>Von der Pume et al. (2009)</td>
<td>Literature review</td>
<td>Various</td>
<td>No</td>
<td>Interdepartmental cooperation an Important aspect</td>
</tr>
<tr>
<td>Famed &amp; Saad (2017)</td>
<td>Literature review</td>
<td>Construction</td>
<td>No</td>
<td>Cooperation determined a success factor</td>
</tr>
<tr>
<td>Dalla &amp; Stathopoulos (2003)</td>
<td>MCDM Software</td>
<td>Maritime innovations</td>
<td>No</td>
<td>Not the goal of the paper</td>
</tr>
<tr>
<td>Bezuijen &amp; Schipperse (2004)</td>
<td>No specified technique</td>
<td>Rail freight</td>
<td>No</td>
<td>No cooperation mentioned</td>
</tr>
<tr>
<td>Papavassiliou &amp; Perek (2009)</td>
<td>No specified technique</td>
<td>Large transportation projects</td>
<td>No</td>
<td>TIMESUB project lacked early on the need for strong and continuous collaboration</td>
</tr>
<tr>
<td>Mota et al. (2010)</td>
<td>Survey and logistic regression analysis</td>
<td>ICT</td>
<td>No</td>
<td>Cooperation and communication with stakeholders and others deemed a statistically significant factor</td>
</tr>
<tr>
<td>Bontekoning &amp; Premus (2004)</td>
<td>Literature review</td>
<td>Intermodal freight transport</td>
<td>No (although involvement of all players considered a necessity)</td>
<td>Seamless cooperation deemed a necessity for one of the projects discussed</td>
</tr>
<tr>
<td>Vissar et al. (2006)</td>
<td>Interviews</td>
<td>Underground freight transport</td>
<td>Yes (the right involvement of stakeholders is an important factor, specifically an influential private stakeholder)</td>
<td>Cooperation not explicitly discussed but lack of high level decision-making stakeholders and private sector interest a failure factor</td>
</tr>
<tr>
<td>Arduino et al. (2012)</td>
<td>Framework</td>
<td>Seaport-related innovations</td>
<td>Yes</td>
<td>Spark for one of the reviewed innovations was cooperative efforts, with the development phase being more successful with a wider cooperation among the various actors involved</td>
</tr>
<tr>
<td>Arvidsson &amp; Browne (2013)</td>
<td>Literature review &amp; interviews</td>
<td>Urban freight</td>
<td>Yes (conflicting objectives of stakeholders one of barriers)</td>
<td>A call for increased cooperation from stakeholders to break one of the barriers, inhibiting project success</td>
</tr>
<tr>
<td>Van den Bergh et al. (2006)</td>
<td>Framework</td>
<td>Sustainable transport innovations</td>
<td>Yes (deemed a success factor, although no specific focus)</td>
<td>Involvement of stakeholders deemed a success factor (as a part of socio-technical factors), but no specific focus</td>
</tr>
<tr>
<td>Wiegman et al. (2007)</td>
<td>Survey</td>
<td>Rail freight transhipments</td>
<td>Softly addressed</td>
<td>Not relevant to the paper</td>
</tr>
<tr>
<td>Widén et al. (2014)</td>
<td>Statistical significance test</td>
<td>Construction</td>
<td>Yes, main aspect of paper</td>
<td>The literature suggests that key stakeholders should be identified at the earliest point in the innovation process because they will have the greatest opportunity to support the idea through the various decision points or gates. Equally, they will have the power to kill it off.</td>
</tr>
</tbody>
</table>

Figure 2. Literature overview table, visualizing the selected literature and its elements
3.4 Emphasis on cooperation

Cooperation or collaboration between stakeholders was prominent in several papers. It was determined a success factor or a very important factor for project success (Faried and Saad, 2017; Bontekoning and Priemus, 2010; Idota et al., 2010; Van der Panne et al., 2003; Van den Bergh et al., 2007; Ghaffari et al., 2017), needed to break barriers, inhibiting project success (Arvidsson and Browne, 2013) and that it can foster innovative efforts (Mueller and Blanquart, 2014). Arduino et al. (2013) determined it a spark for one of their reviewed innovations and that the development phase might be more successful with a wider cooperation among the stakeholders involved. Widén et al. (2014) agree and state that productive change can take place not only with a single stakeholder but with the cooperation of key stakeholders. Papaioannou and Peleka (2006) identified that the Thessaloniki Submerged Arterial (THESUB) project lacked early on the need for strong and continuous collaboration between stakeholders. Visser et al. (2008) reviewed ex-ante the failed Dutch underground freight transport project (OLS-ASH). Conflicting clarification of roles, interest and complexity between the numerous stakeholders, suggesting a lack of cooperation and information flow, was determined one of the failure factors of the project. The remainder of the reviewed literature focused on other criteria than cooperation (Wiegmans et al., 2007; Ballis and Stathopoulos, 2003; Božičnik and Schliephake, 2005).

The findings of the literature review provide assistance in formulating a suitable research approach. With the identified lack of focus on cooperation in innovation literature, it becomes challenging to identify the SFFs of a project that relies heavily on cooperation to realize its full potential. No suitable frameworks exist in literature, to the best of the authors knowledge, that attempts to do so, presenting an interesting starting point to the research approach.

3.5 Research Approach

A framework will be formulated, it has the goal of aiding innovative projects relying on cooperation by identifying cooperative challenges and the SFFs. To formulate the framework, frameworks and theories are selected. Frameworks are available in the literature that combine different disciplines, namely Feitelson and Salomon’s (2004) political economy model, Hekkert et al.’s (2007) functions and Geels’s (2002) dynamic multi-level perspective. Frameworks and theories aimed at facilitating cooperation are threefold as well. First, Alves and Menezes’ (2015: 92) three step model for partner selection in co-opetition, which allows for a “conscious and judicious selection based on specific criteria related to partner’s operational skills, resources, effectiveness and trust”. Second, Social exchange theory is incorporated. It studies the relations and behaviour of actors that are formed by the benefits and costs they provide in the relationship. Molm’s (1994) theory of dependencies in social exchange can affect the structure of an alliance, its transactions and outcomes. Due to the dependencies formed in an alliance, several elements, vital for successful collaboration and information sharing can affect the relationships. Wu et al. (2014) attempted to capture these elements, through their identified four key social exchange issues: trust, commitment, reciprocity, and power. Their study reports that when enabling supply chain performance, information sharing and cooperative efforts are important affairs. They conducted an empirical study, using a structural equation model, to assess the effect of the aforementioned four key social exchange issues as precursors of enabling information sharing and collaboration. Their findings show an important link between information sharing and collaboration and that the four key issues all had significant loading on collaboration, except reciprocity. Therefore, the three key criteria, power, trust and commitment, are to be considered as factors when exploring the will for cooperation between the stakeholders in the framework. Finally, Transvectio’s innovative project will be applied as a case to assess the framework, subsequently identifying the key SFFs of the project.

4 FORMULATING THE FRAMEWORK

This section presents the framework and outlines the literature and concepts that form the input for the framework. As previously mentioned, total of six papers are amalgamated to formulate the framework. First, the framework is presented, and the building-blocks are explained. Second, a discussion is undertaken including a critical review of the advantages and disadvantages of the framework.

5 PRESENTATION OF THE FRAMEWORK

The following section presents the framework. Due to its focus on cooperation and holistic innovation analysis, it is coined: The Cooperative Innovation Analysis Framework (CIAF). This framework is specifically focused on innovation endeavours that intend to engage in cooperation with one or multiple partners. However, it could also be utilized to some extent with the absence of cooperation. The framework is first visualized in Figure 3 and then a discussion is undertaken to explain its mechanisms. To make it explicit, what has been extracted from which literature to formulate it, Figure 4 is presented.
THE COOPERATIVE INNOVATION ANALYSIS FRAMEWORK

Figure 3. The Cooperative Innovation Analysis Framework
<table>
<thead>
<tr>
<th><strong>Building-block</strong></th>
<th><strong>Origin</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Alliance’s social relations criteria</td>
<td>Theory of SET extracted from Molm (1994) and formulated into questions, either directly or modified to be more exhaustive.</td>
</tr>
<tr>
<td>Level of trust, commitment and power</td>
<td>Coupled in the framework with Alliance’s social relations criteria. Directly extracted from Wu et al., (2014: p. 130).</td>
</tr>
<tr>
<td>Technological characteristics and Resources</td>
<td>Geels (2002), Feitelson and Salomon (2004) used to brainstorm and formulate questions.</td>
</tr>
<tr>
<td>User behaviour and public perception</td>
<td>Feitelson and Salomon (2004) and Hekkert et al. (2007) used to brainstorm and formulate questions.</td>
</tr>
<tr>
<td>Industry structure and interest</td>
<td>Geels (2002) terminology used. Hekkert et al. (2007) used to brainstorm and formulate questions.</td>
</tr>
<tr>
<td>Policy and decision making procedures</td>
<td>Geels (2002) and Hekkert et al. (2007) used to brainstorm and formulate questions.</td>
</tr>
</tbody>
</table>

**Figure 4.** Overview of the origins of the CIAF
5.1 Describing the building-blocks

To aid the reader’s comprehension of the framework, a description of the building-blocks is presented. The framework aims to facilitate innovative efforts where cooperation is an integral part. Cooperation entails the inclusion of viable stakeholders. The amount of stakeholders and the difficulty of making a suitable choice can often be overwhelming, therefore a selection has to be made to produce a viable pool of stakeholders. In order to do so, the process of partner selection is applied. Social relations criteria is then applied to the viable pool of stakeholders to explore the alliance’s possible social relations and interactions. The components (green and orange boxes) make up the partner selection and social relations criteria. The viable pool of stakeholders are those that could be considered as cooperative partners. The viable pool should be considered once moving to the next stage of the framework, the innovation analysis (red colored components). This is due to the potential influence certain stakeholders can have on the innovation analysis and vice versa. The innovation analysis consist of eight facets. All the facets are interrelated, meaning that they can affect each other and overlap. The landscape developments encircle all the other facets to illustrate the overarching effect they can have. The heart of the innovation analysis is the symbolic meaning of technology and ethical concerns. It is strategically placed in this illustration in an attempt to make the analyst reflect on the ethical and moral ramifications that innovations can carry. Once completing the framework, the analyst is presented with the following: Viable partners for cooperation, expected dynamic of the cooperative alliance, an analysis of the innovative endeavour and identification of SFFs.

The components and facets that make up the framework are extracted from the theories. They consist of series of questions and queries that allow the researcher, performing the analysis, to examine the multitude of issues, challenges and hurdles that can emerge during the innovation’s development and adoption. Figure 4, previously referenced, shows from which literature this questionnaire is formulated. Keep in mind that this questionnaire is not an exhaustive check-list to tick off, but rather to make the firm/entrepreneur take a step back to explore the dynamics and functions of both potential cooperative relationships as well as innovation development and adoption.

5.2 Cooperation Segment

For clarity, the framework is segmented into two parts. The first segment presents the questionnaires that form the buildings blocks of the cooperation segment.

5.2.1 Partner Selection

This section of the CIAF should be performed in an iterative fashion. Every case is different and aspects, problems and solutions can emerge during the analysis process later on. Therefore, some parts can be revisited later on. However, the author does highly endorse that all parts of the analysis are completed.

The selection of the right partner when forming cooperative alliances is vital as an inadequate selection can have dire consequences. Whether the decision is to cooperate with a singular partner, or choosing from several candidates, the entrepreneur/firm engaging in cooperation should ask themselves the following questions.

- Are there any previous (personal or business related) relationships with other stakeholders?
- How is the current relationship with stakeholders?
- Can each party contribute something of value to the partnership?
- Is each party free to negotiate the terms and conditions for the cooperative agreement?
- Can all parties find a positive balance between the pros and cons of the relationship?
- Do all parties have a shared vision of goals and is their interpretation and perception of the market aligned?

According to their research Alves and Meneses (2015) find that prior personal or business related ties are an effective way to form cooperation alliances when engaging in coopetition, although it is certainly not a prerequisite. Previous positive ties should not be a deciding factor for the selection of partners and it is therefore important to keep this bias in mind. Despite their focus being on alliances engaging in coopetition, alliances that do not engage in coopetition but rather ’regular’ cooperation should also perform this analysis. Exploring the nature of the relationship, the distribution of benefits, power levels and visions of parties involved, has significant merits to ensure the relationship will be healthy and balanced. This questionnaire should serve as an instrument to provide the analyst an abstract idea of the viable partner pool.

The freedom to negotiate the terms and conditions is a vital factor to ensure rights and benefits are distributed fairly and to protect actors if power imbalances are perceived. Although, situations do occur where decision makers have to choose the least bad option or simply do not have a choice but to engage in sub-par alliances. Engaging in this type of introspection

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1 Cooperating and competing at the same time.
reduces the likelihood of discovering later that the firm/entrepreneur has been locked in such an alliance. However, there is a need to explore the dynamics and form predictions on the relations between partners. This is what Social Exchange Theory (SET) attempts to do. The CIAF regards the partner selection process as a high level analysis of creating a viable pool of potential partners, then using SET as a low level analysis to dive deeper, forming predictions on expected behaviours of the viable partners.

5.2.2 Alliances’ Social Relations & Interactions

To perform this lower level analysis, the viable pool of partners should be evaluated based on the following criteria and questions, starting with the possible stakeholder outcomes.

- Are stakeholder outcomes dependent on:
  1. Solely on your own behaviour? (independence)
  2. Solely on the other stakeholders behaviour (dependence)
  3. On some combination of behaviours by both self and others? (interdependence)

When exploring the possibility of cooperation, it is essential to realize the relationship outcomes, as sub-par outcomes can form imbalances in power levels and erode trust if taken advantage of. If the outcomes are reliant solely on your own behaviour, the analyst might need to reconsider if there is actual need for cooperation, as you are not dependant on anyone else in the alliance. On the contrary, if you are solely reliant on other stakeholders behaviour, it creates a dependence. This creates opportunities for sub-optimal behaviour, as stakeholders can end up not reciprocating.

When a dependent alliance is identified, incentives are formed for sub-optimal behaviour. This is also a factor for interdependent relationship and the risk grows when the structure of the exchange relations are indirect. The goal here is to provide insight into the possible exchange outcomes of certain structures and the risks they can carry. Whether the alliance is dependent or independent, the analyst should explore if incentives or opportunities of sub-optimal behaviour are in place.

- Is there an incentive not to reciprocate?
  - When? How? What are the consequences? Acceptable? Ways to counteract?

- Could anyone in the group free-ride?
  - When? How? What are the consequences? Acceptable? Ways to counteract?

If an incentive not to reciprocate is identified, the analyst should attempt to identify when it can occur, it what way, what the consequences are, if it is acceptable and if there are any ways to counteract this behaviour. At times, the consequences can be minimal or acceptable in the grand-scheme. If a high chance or blatant opportunities for non-reciprocity are identified, it is recommended to minimize them through methods such as negotiations or contracts. However, each case is different and there is no panacea that effectively eliminate this risk. If no options are available to reduce the sub-optimal behaviour, the culprit might not be suitable and replacements should be explored if possible. The above applies as well to free-riding behaviour. To clarify, free-riding is when partners receive benefits without supplying anything in return. This risk can sometimes be disregarded and is not as detrimental as non-reciprocity. If free-riders are identified, ways should be explored if their involvement is actually needed and if they can be excluded from the alliance.

The next step is exploring the structure of transactions and allocation of profits. The structure of transactions can be made in two ways, either negotiated or reciprocal. Reciprocal in this sense means that decisions made by the partner are made individually. The other partner(s) in the alliance rely on trust and good-will that these decisions made are performed with all parties interests in mind. The other option are negotiated transactions, where decisions are made jointly, and interests can be protected better.

- What is the structure of the transactions?
  - Negotiated: Decisions made jointly
  - Reciprocal: Decisions made individually

- What would be the allocation of profits/benefits?
  - Shared pool?
  - Negotiated beforehand or not?

- Do all parties involved know the value of what is being exchanged (profits/knowledge/information/etc.)

The allocation of profits/benefits is likely what most partners consider the primary facet of the cooperation. Therefore, making it explicit how the allocation is arranged is vital. One option is to generate a shared pool. This can be suitable if the benefits of the cooperation are intangible, such as knowledge or information, or in some cases tangible, like infrastructure. However, negotiation before the cooperation begins is highly recommended as it protects both parties interests. The power levels become more balanced and the cooperation is not solely built on trust. Knowing the value of the benefits/profits is also extremely important to ensure parties are not being deceived. This can often be difficult
to pinpoint as intangible assets, such as knowledge or information, might be much more important to one party than the other. Knowing the full value of what is being exchanged is often hard but vital to sufficiently explore.

What also factors in is the level of trust and power between the partners in the alliance. Power imbalances in the relationships can result in bullying tactics and sub-optimal behaviour. Trust and commitment can also be hazardous. A lack of trust is detrimental in cooperation but blind trust is also inherently risky. Carrying trust towards partners, while securing fair allocation of benefits through negotiation, is ideal. However, it can be hard to determine the level of trust, commitment and power of other parties in the alliance. The following questions can aid the analyst to gain insight into these key factors, as according to Wu et al. (2014).

- **Trust**
  - Will the partner(s) keep promises made and protect your right?
  - Will the partner(s) be truthful and frank with you?
  - When making decisions, will the partner(s) consider your welfare as well as their own?
  - Will the partner(s) help you when you have problems?

- **Commitment**
  - Are the partner(s) willing to make sacrifices to help you?
  - Are the partner(s) willing to continue the relationship with you?
  - Are the partner(s) willing to spend a higher amount of time and effort with you?

- **Power**
  - Do you and the partner have the same power to influence each other in decisions, R&D and other joint activities?
  - Does the partner have the power to influence you in decisions, R&D and other joint activities?
  - Do you have the power to influence the partner’s decisions, R&D and other joint activities?
  - What resource capabilities do you have compared to the partner?

Further questions are sure to emerge when going through the list. This should not be considered a check-list but rather introspective questions to make the analyst really reflect on the level of the three key criteria in social exchange, trust commitment and power. If lack of trust is perceived, attempt to explore ways to strengthen it. This is easier said that done, as trust is built over time and a long period of trust building can be swiftly destroyed. Therefore, securing positions and allocation of benefits with strict negotiations and contractual agreements is vital. Closely linked to trust is commitment. Are your partners willing to fully commit themselves to the relationship, continue it and even make sacrifices? These questions can be hard to answer and usually materialize over time. They should be kept in mind throughout the cooperation. The level of power is easier to perceive than the other two criteria. Resource capabilities, network sizes and image can play a large part in the ability to control the alliance. In some cases, power imbalances are acceptable, as long as they are not abused. To refrain from creating that dependence, ensuring the relationship is interdependent, if possible, making decisions jointly and negotiating for a fair distribution of profits/benefits can all aid in leveling out power imbalances.

At this point in the partner selection and relations structure process, a promising viable pool or even ideal candidates could be identified. Naturally, it can occur that no suitable candidates for an alliance can be pinpointed. Then the analyst should investigate if he/she/the firm can forgo the alliance and operate independently. If that is an unfeasible option, the difficult choice of the least bad option must be made.

### 5.3 Innovation Segment

The next process is performing an analysis of the innovation itself, attempting to identify possible SFFs, along with potential barriers that might emerge. The questionnaire is formed in a generalized way in an attempt to capture important aspects related to developing and implementing innovations. However, each project is different and the high heterogeneity of innovation endeavours could result in some questions to be vague or inapplicable in certain cases. For increased clarity, the questions are elaborated with examples and discussed.

#### 5.3.1 Landscape developments

The first element that should be explored are the landscape developments. They pertain to the slow changes of society. They can be for example:

- Cultural changes
- Demographic trends
- Broad political changes

If landscape developments are identified, they should be kept in mind while performing the rest of the analysis. Cultural changes, such as attitudes, values and aspirations in society can provide opportunities for innovations
to emerge. However, these are usually very slow in emergence. The other two developments are also normally slow emerging but can happen abruptly due to unrest. This is certainly the case for demographic trends, such as the influx of refugees due to famine or war, as was seen with the Syrian civil war in 2011, producing approximately 5.6 million refugees (UNHCR, 2020). This can create windows for innovations to emerge and affect other landscape developments, such as cultural changes. Broad political changes can also provide windows of opportunities when a new political party or a coalition gains power. The same can happen with radical changes in governance, shift of regimes or in political ideologies (e.g. from socialism to capitalism), or even increased focus on environmental policies.

5.3.2 Technological characteristics & Resources
- Is the innovation technologically feasible/difficult?
- Are there high costs/resource usage?
- Internal or external resources needed?
- Development of new technology or re-usage of older one?

Often, the technological aspect is the most vital part of the innovation development. The main question is if the innovation is technologically feasible and how difficult it is to develop, coupled with the resources needed to do so. It also needs to be studied if internal resources, such as knowledge and financial capabilities, are sufficient. For certain endeavours, in-house capabilities are lacking and therefore external resources must be sought. This could entail the need to seek cooperative alliances. Another opportunity is to explore potential grants, subsidies or tax exemptions for the proposed innovation. Currently, numerous governments around the globe are seeking ways to reduce emissions and introduce a higher share of sustainable energy. To do so, subsidies or tax exemptions are often provided for such endeavours. These windows of opportunity should be tracked.

5.3.3 User behaviour and Public perception
- How will users perceive the innovation? (Alternatively: What is the public’s perception of the innovation or of the problem it intends to solve?)
- Is it difficult to operate/utilize (usage) for users?
- Will the innovation meet users needs?
- Are users familiar with the innovation (something similar they have used before)?
- Specific technology they must own/access/ know how to use to utilize innovation (e.g. smart phone/electric car/etc.)?

User behaviour practices attempt to explore how user perceive and intend to use the innovation. Groundbreaking innovations tend to shape user behaviour but conversely, innovations are also shaped by user behaviour and needs. It can prove beneficial to gain insight into public perception, by exploring the number of positive versus negative reviews or discussions in journals and grey literature, regarding the innovation or variations of it that have been attempted. Exploring if the innovation is accessible to a wide group of users, or that the intended user base has an easy way of operating, can shape the development of the endeavour. Avant-garde innovations, that users are unfamiliar with, can find increased success by operating in a way that reminds users of something previously released that they enjoyed, or breaking the path towards a new era, shaping user behaviour in the process. The introduction of online payment is a case of the latter. Trends help immensely in this process. Path dependencies also come into play here. Once newer, contemporary designs are released, they rarely revert back to previous versions or designs. Such is the case with touch screen display, where buttons are rarely seen nowadays in new technology. If these questions seem hard to answer, discussing with or performing surveys on the intended user groups could aid in clarifying the needs of the users.

5.3.4 Application domains (markets) & Market formation
- Is the market accessible for introduction of new innovation/technology?
- How susceptible is the market to changes (e.g. technological/social) or introduction of new innovations?
- Is the market growing or shrinking?
- Is there a high number of competitors?
- Is the market competing with other markets? (e.g. different modes of the freight transport market)

The application domain, or essentially the markets where the innovation will be introduced, can determine success or failure. A highly saturated market can be difficult to penetrate and gain a footing in. Highly competitive but ever growing markets, such as information technology, provide numerous opportunities for innovative endeavours, as has been seen with artificial intelligence and cloud solutions, which then provide capabilities to use that tech for additional innovation development. Penetrating locked-in markets with high monopolization, where power imbalances are extreme, is rarely effective, unless providing something niche or targeting a discrete market segment. Seeking ways to access protected markets can be highly beneficial in the early, crude stages of innovation implementation. If tariffs, quotas, subsidies or other tools are in place in certain markets, they can aid or hamper, the implementation of the innovation. Therefore, exploring the market status and even ways to pivot to a new market, if conditions are substandard, could be advantageous.
5.3.5 Symbolic meaning of technology & Ethical concerns

- Is the innovation a symbol for wealth/status?
- Does the innovation alienate certain groups?
- Does the innovation offend certain individuals/groups?
- Is the innovation ethical and moral?
- Has the innovation potential to cause environmental or other types of damage?

This element explores the symbolic meaning of technology, what status it provides, the societal effect it can have and potential ethical dilemmas. Each entrepreneur has to evaluate these elements on the basis of their own beliefs. The production of weapons can be seen by some as unethical and by others as a business opportunity. Additionally, industry shaping innovations can put myriads of employees out of work. The author is not attempting to be a paragon of virtue by making the analyst exploring these aspect, but everyone serves a duty to our earth and to one another. If the innovation has the potential to cause damage, either environmental or to humans, the author highly recommends the exploration of alternatives.

5.3.6 Infrastructure

- Is physical or virtual infrastructure needed?
- Are infrastructural changes needed (such as to introduce the innovation or extract its full potential)?
- Is the current infrastructure suitable?
- Are the high costs of infrastructure changes/maintenance?

The aspects of infrastructural needs are often apparent when developing innovations but are still vital to sufficiently explore. Sometimes current infrastructure needs to be changed or adapted to suit the innovation, or to extract its full potential. This is the case with 5G implementation, where the shorter wavelength calls for increased amount of cell towers. A more obscure aspect is the maintenance costs of the infrastructure and its lifetime, which is not always apparent at first.

5.3.7 Industry structure & interests

- Is the development of the innovation reliant on a scarce resource, or one that fluctuates in price/availability?
- Are there legal barriers or limitations in the way for innovation introduction/development?
- Is there high availability of means for production of the innovation?
- Are there stakeholders with interests to protect (e.g. competitors that want to protect their market status).

The industry structure is linked to the application domains of the innovation. It attempts to explore if the industry is saturated (perhaps locally), if certain industry barriers are in the way and what means are available for the production of the innovation. If a mandatory resource is needed for the development of the innovation, it is vital to explore if high demand or fluctuations in price are common for the resource. This is the case with silicon. It is heavily used in the computer and microelectronics industry, but is also necessary to produce contemporary solar cells. A high demand or a lower supply of silicon results in price hikes for both industries. The means of production for the innovation can also affect its development and implementation ability. If insufficient means, such as knowledge, space or facilities are unavailable in-house or locally, outsourcing globally could be the most suitable option. In turn, transportation costs and other expenses surface. Finally, analysts should be alert of the current dominant technology or artefact the innovation intends to replace or intervene in. Competitors and other stakeholders might stand to lose gains, such as financial, if the innovative endeavour seeks to compete with the dominant technology or artefact. If they possess sufficient power, they can attempt to slow down or block the development and/or implementation of the innovation if a chance presents itself. The analyst should explore if this could pose a threat and seek ways to minimize negative outcomes.

5.3.8 Policy & Decision making procedures

- Is the innovation adoption in-line with the organization’s (innovation developers/adopters) vision and the current in-house political climate?
- Are the are any specific government, local or global policies that can legitimize or aid the innovation adoption? (e.g. reducing fossil fuels, subsidies, tax exemptions)
- what is the public/private perception of the issue the innovation intends to solve/intervene?
- Political feasibility of the innovation?

Both public and private (in-house) policies can affect innovative endeavours. Larger firms can experience tensions in communication and vision and therefore it can be beneficial to explore the current climate. If changes in top management are taking place, in can both open windows for innovations and halt their advancements. Divergence in companies long-term visions can also have the same effect. For entrepreneurs or smaller firms, this becomes less of an issue. As discussed previously, public policies can provide aids through subsides, tax exemptions or other stimuli and should be explored. However, despite the lack of any public stimuli, public, private and political perception on issues and the ideal way to solve them can also provide legitimacy to innovative endeavours. The global push for sustainable energy and
pollution reduction has increased legitimacy for electric and biofuel vehicles and created floating wind farms in Scotland. Although, the perception of issues and the perceived ideal way to solve them is not always the most suitable solution. This is affected by sanctioned discourse, "the prevailing dominant opinion and views, which have been legitimised by the discursive and political elite." (Jägerskog, 2002: p. 1). Nuclear energy is one of the cleanest and safest ways of generating energy available today. Once operational, nuclear plants have similar emissions to solar and wind energy. However, due to accidents, such as in Chernobyl 1984 and Fukushima in 2011, public opinion has been extremely negative towards nuclear energy, with currently only 10% of the world's electricity being produced in nuclear plants (World Nuclear Association, 2020). Therefore, if the development and/or implementation of the innovation can be affected the public sector, its political feasibility can be a major hurdle or a window of opportunity. Politicians are often reluctant to make decisions that reduce their likelihood of re-election, especially when nearing elections. Closely linked to the aforementioned aspects is also recognizing who has the power to influence important decisions that relate to innovation development and implementation, whether it be in-house, alliance based, private or public.

5.3.9 Techno-scientific knowledge

- Is significant R&D needed for innovation development?
- Is there enough knowledge in-house or does it need to be outsourced?
- Is the knowledge niche or general (do many organizations have access to it?)
- Has this innovative endeavour been tried before?
- What was the success of previous tries? What can be learned?

The final aspect to explore is the techno-scientific knowledge. It attempts to encompass the knowledge and skill needed to develop and advance the innovation. If the innovation is technically difficult and requires expertise or high competency performing specific tasks, it can be costly and time consuming to acquire. If the knowledge needed is very general and several organizations or entrepreneurs have access to it, the innovative idea could be replicated and developed ahead of the original. Therefore, the analyst should be careful of what aspects of the innovation he is sharing, for what purpose and how he can protect intellectual property. This might seem obvious but numerous examples exist of intellectual property theft. Even without ever knowing about the existence of a similar innovation, firms/entrepreneurs can be beaten to market by similar innovations and lose out on the benefits. Exploring issued patents and investments in this type of R&D can provide the analyst with some insight into this issue. Finally, much information can be gained by exploring past efforts of similar innovations and the successes and failures they had. Barriers and hurdles can possibly be circumvented or reduced by not repeating history and making the same mistakes twice.

6 DISCUSSION

6.1 Connection between used theories & Arguments for theory selection

The theories selected to formulate the tailored framework aim to get a concentrated view on the potential cooperating candidates, by exploring their social relations and potential interactions. Nonetheless, there are still myriads of other challenges that need to be identified and overcome, such as technological, societal and ethical. The second section of the selected theories take aim of that. Due to the selected theories, the building-blocks that make up the cooperation and the innovation segment lack a connection. The selection of partners and their relations naturally can affect the requirements of the innovation. The CIAF does take note of this factor but the innovation segment is not explicitly affected by the cooperation segment. The chosen first step in the framework was evaluating which potential candidates could be suitable. When a high number of stakeholders are available, such as in Transvectio’s case, it becomes very time consuming and tedious to assess all of them individually. Creating a viable pool or even pools of potential cooperating partners, can allow the analyst to focus on assessing stakeholder relations. If a pool seems unfeasible for partnership, the partner selection process can be performed again if necessary. The selection of partners can involve both neutral partners and those in direct competition with the project owner. Alves and Meneses (2015) partner selection framework was chosen to capture both of these aspects. If the choice of partners is unary, the partner selection can be overlooked but the potential social exchange of the alliance (or the sole partner) should be evaluated. To do so, Molm (1994) social exchange theory is selected to evaluate the elements of the relationship, such as partner’s structure of outcomes and transactions, identifying potential sub-optimal behaviour and the allocation of benefits the alliance can generate. Coupled with Molm is Wu et al. (2014) key exchange issues in social exchange, namely the level of trust, commitment and power in the relationship. An imbalance of these elements can produce turmoil in the relationship, resulting in a defective and disadvantageous alliance. A connection can be made between the theories of Molm (1994) and Wu et al. (2014). Molm addresses the same key exchange elements as Wu, reciprocity, commitment, power and trust. However, Molm does not address if these elements
are equally important or impactful in alliances. Wu makes this explicit by exploring if some elements have more of an impact than others in cooperative relations. This results in disregarding reciprocity but including the other three. For a comprehensive analysis of the challenges an innovation might face when commencing development, three frameworks were selected to capture a wide array of analysis techniques and theories. The first is Feitelson and Salomon (2004) political economy model which describes the factors and barriers new ideas must break through before being adopted. It focuses on the political challenges and the correct "policy windows" for innovations to break through. Due to not all innovations being in the public sphere, Hekkert et al. (2007) and Geels (2002) frameworks were added. These two frameworks are connected based on their view of technological transformations being embedded in a system of systems. While also considering similar factors as Feitelson and Salomon, they take a broader view, incorporating the private sphere. The focus is on more practical approaches, with additional factors and elements being considered.

Innovation endeavours tend to be very heterogeneous, with distinct challenges and considerations to be evaluated each time (Van der Panne et al., 2003). Creating a one-size-fits-all recipe for cooperation is unlikely to be effective. The selected literature and the method of approaching the cooperative and innovative challenges are partially aimed at suiting Transvectio's project, but not exclusively. A framework performing the same function as the one formulated in this thesis does not exist, to the best of the authors knowledge. Therefore, the characteristics of the project were used as a reference to assess the angle of approach. Nonetheless, consideration was taken during the selection and approach, to make it general enough to aid projects facing similar challenges. Using only one reference case is contradicting to what was written earlier, that innovative endeavours have heterogeneous challenges and considerations. However, an argument can be made that these endeavours have several homogeneous characteristics. If cooperation is an integral part of a project's success, a partner selection must be made at some point in the process. This is relevant both for a small group of potential partners and when facing a broad selection. Building on top of that is Social Exchange Theory. It is utilized to aid the analyst in mapping out the relationship structures and interactions of a cooperative alliance. A sub-par relationship with large power imbalances, lack of trust, high risk of free-riding or sub-optimal behaviour is unlikely to be fruitful or long-lasting. Gaining a perspective into the potential relationship outcomes between stakeholders could help identify good partnerships from bad ones early on. Furthermore, the results of the literature review (Chapter 3) were taken into consideration. The findings show that cooperation was determined a success factor or a very important factor. Additionally, Widén et al. (2014) recommend stakeholder inclusion early on in the innovation process, as well as Arvidsson and Browne (2013) determining conflicting objectives of stakeholders as a barrier. Performing the cooperation segment first takes light of this, making a partner selection and exploring the potential relationship structures. This is done to make the analyst consider the early inclusion of stakeholders and their potential objectives and roles.

The second segment is focused on the innovation's characteristics, relating to technical, societal, ethical and other aspects. As previously noted, the three innovation analysis frameworks of Feitelson and Salomon (2004), Geels (2002) and Hekkert et al. (2007) were selected to capture a wide array of analysis techniques and theories. Selecting only one of the three would result in an incomplete analysis and missing factors. Swapping out any of them, or even all, would result in a drastically different CIAF. The author was familiar with the selected frameworks and determined them to be sufficient for this first iteration of the CIAF. Nonetheless, even with the inclusion of three frameworks, the CIAF is not exhaustive.

6.2 Advantages & limitations

This framework could hopefully aid entrepreneurs or firms to analyse their innovative endeavours, specifically those engaging in cooperation. What was interesting to see when formulating the CIAF is that none of the innovation frameworks addressed ethical concerns. To remedy this shortcoming, it was specifically added into the CIAF. Ethical considerations can often tend to be ignored or glossed over so their explicit addition is meant to combat that. The framework possesses several advantages over other forms of innovation analysis frameworks. One of those advantages, as previously mentioned, is the increased focus on cooperation. Attempting to make those engaging in innovative endeavours be attentive to the numerous downsides of a partnerships, these introspective questionnaires could steer players away from potentially detrimental ones. Conversely, it could guide them towards more healthy and beneficial alliances. By combining three separate innovation frameworks and extracting their analysis tactics, the framework manages to capture numerous angles and perspectives of innovation analysis. Although, this multifacetedness could also be considered a downside, as the framework is quite time consuming to sufficiently complete. The chronological order of the framework could be less appropriate for certain innovation analyses as the need for cooperation could emerge after the innovation segment. However,
each segment can be completed in which way the analyst finds suitable, as well as in an iterative fashion, revising a segment that has previously been completed. Evaluating the framework critically exhibits several weaknesses. Little focus is put on the financial aspects of the innovative endeavour. Fundamentally, if the innovation’s costs exceed the benefits it creates, it becomes financially unfeasible. While a financial feasibility analysis might be more suited to explore such facets, the framework could have made it explicit. The framework requires considerable knowledge of the viable partner for cooperation. If the partner is a black-box and little to no information is acquired, it can be strenuous to answer some of the questionnaire, in an attempt to gain insight into the potential relationship. In that case, speculation and argumentation would have to suffice, using the framework’s leading questions to brainstorm. This also highlights the difficulties of successfully cooperating, which can be exacerbated by the strategic behaviour of players when entering negotiations, refusing to reveal their true intentions until it favours them. Transvectio’s project and its characteristics somewhat affected the formulation of the framework. With no comparable framework existing in the literature, the project was partially utilized as a model to create the CIAF. Innovation projects can be very dynamic and heterogeneous with different challenges and factors to be considered each time. Therefore, the question must be put forth, if the framework would be formulated differently given a different assessment case. Finally, the link between the cooperation and the innovation segment of the CIAF is not very strong. The analysis performed in the innovation segment can be affected by which stakeholder is chosen to cooperate with. Little attempt was made to connect the two segments and it can be considered a downside of the framework.

7 ANALYSING TRANSVEXTIO’S INNOVATION PROJECT THROUGH THE CIAF

Transvectio’s innovative endeavour, is used as a case to evaluate the efficacy of the CIAF. Eight success and failure factors were identified in total, three and five factors for each category, respectively. The success factors are presented in table 1 and 2.
7.1 Success factors

The success factors identified in the chapter are presented below in table 1.

<table>
<thead>
<tr>
<th>Success factor</th>
<th>Description</th>
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<tbody>
<tr>
<td>Low direct competition</td>
<td>Despite a high number of carriers in the operation area, the share of direct</td>
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<tr>
<td></td>
<td>competition is quite low. Popular transport locations, such as large cities</td>
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<td></td>
<td>or other major hubs have several carriers offering transport, while some</td>
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<td></td>
<td>shipping points are offered by one or few carriers. The direct competition</td>
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<td></td>
<td>in rail transport, where carriers ship to the same location, is only about</td>
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<td></td>
<td>10%. The low percentage of direct competition decreases the chance and</td>
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<td></td>
<td>amount of stakeholders perceiving the platform as shifting business away</td>
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<td></td>
<td>from them to competitors.</td>
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<tr>
<td>Oculus’s exposure issue</td>
<td>Transvectio’s perception is that clients are unaware of the advantages of</td>
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<tr>
<td></td>
<td>using the terminal hub, as well as having issues finding information and</td>
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<tr>
<td></td>
<td>suitable carriers. If stakeholders also perceive this exposure issue, they</td>
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<tr>
<td></td>
<td>could see the platform as a much needed remedy for the hub.</td>
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<tr>
<td>Client growth</td>
<td>The increased growth of clients, facilitated by the Asia-Europe connection</td>
</tr>
<tr>
<td></td>
<td>can be a vital factor. This growth can reduce stakeholders fear of a</td>
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<tr>
<td></td>
<td>saturated market, where the introduction of the platform would shift</td>
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<tr>
<td></td>
<td>business to competitors. However, this success factor hinges on the growth</td>
</tr>
<tr>
<td></td>
<td>of the bi-continenental connection, as well as capturing and maintaining</td>
</tr>
<tr>
<td></td>
<td>these new clients.</td>
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</tbody>
</table>

Table 1 Summarized success factors for the innovative project

7.2 Failure factors

The identified failure factors are presented below in table 2.

<table>
<thead>
<tr>
<th>Failure factor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial feasibility</td>
<td>The most important factor to consider is the financial feasibility of the</td>
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<td></td>
<td>platform. If the costs of developing and implementing the platform are much</td>
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<tr>
<td></td>
<td>greater than the expected benefits, it becomes unfeasible to develop.</td>
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<tr>
<td>Failing to cooperate</td>
<td>If all stakeholders refuse to cooperate, the platform would be limited to</td>
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<td></td>
<td>offer only Transvectio’s connections and services. While that could</td>
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<td></td>
<td>materialize to be a successful endeavour, it heavily limits the platform’s</td>
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<td></td>
<td>growth and potential.</td>
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<tr>
<td>Data sharing</td>
<td>Cooperating stakeholders might be unwilling to share the large amounts of</td>
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<td></td>
<td>data needed to offer their services on the platform. This can be due to</td>
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<td>several reasons, such as fear of being strategically mapped by competitors,</td>
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<tr>
<td></td>
<td>and high investment costs of manipulating data sets or systems to fit the</td>
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<tr>
<td></td>
<td>platform.</td>
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<tr>
<td>The Polish factor</td>
<td>With Poland strengthening their Chinese ties, they could become China’s first</td>
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<td></td>
<td>point of contact with Europe, potentially clitching large volumes of cargo</td>
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<td></td>
<td>from the terminal area. Loosing a large portion of potential Chinese</td>
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<td></td>
<td>customers to Poland could have detrimental effects on the growth and</td>
</tr>
<tr>
<td></td>
<td>success of the platform.</td>
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<tr>
<td>Lack of urgency</td>
<td>Research projects and pilots aimed at providing similar functions as the</td>
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<tr>
<td></td>
<td>booking platform, have been attempted, such as Synchro-NET, or are in</td>
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<td></td>
<td>development, such as Taubooker. These projects have lacked private interest</td>
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<td></td>
<td>and a clear direction facilitated by a project owner. They have been deemed,</td>
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<td></td>
<td>for now, unsuccessful. Nonetheless, considerable urgency is needed from</td>
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<td></td>
<td>Transvectio to refrain from sunk costs being put into their project if</td>
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<td></td>
<td>existing pilots take flight, becoming successful and wide-spread.</td>
</tr>
</tbody>
</table>

Table 2 Summarized failure factors for the innovative project
8 CONCLUSION, DISCUSSION AND RECOMMENDATIONS

This paper set out to identify the SFFs of a cooperative innovation project, presented in the main research question: What are the success and failure factors of a cooperative innovation project, identified with the aid of a framework, incorporating cooperative aspects. To reach an answer to the main research question, frameworks and theories found in the literature were utilized to create a framework, coined the Cooperative Innovation Analysis Framework (CIAF). It performs both an SFFs analysis of the innovation and identifies challenges in cooperation. Transvectio’s innovation project was applied to the CIAF to assess the efficacy of the framework and to identify the SFFs of the project. However, due to the research question being more akin to a process, rather than a closed question, the efficacy of this process can be debated and is done in the discussion below.

A discussion is undertaken in the next section to assess the work performed and critically evaluate the paper. This chapter is concluded with recommendations for further research.

8.1 Discussion

The approach chosen in this thesis provided an answer to the main research question. Note that the wording of “an answer” is done deliberately. This is to highlight that despite an answer being reached, a different researcher facing the same question is sure to reach a non-identical conclusion. This is due to the research question being a process, rather than a closed question, the efficacy of this process can be debated and is done in the discussion below.

It should be noted that the innovation literature selected was more concentrated on exploring the possible break-through of innovations into their embedded systems. They rather view this break-through of innovations as a “how they could”, rather than “how they should”, albeit Hekkert et al.’s framework is more akin to the latter. The CIAF then transforms these facets into a more practical approach, amalgamating them to form a unity. Despite the CIAF consisting of this wide array of factors to consider when analysing the project, it did not manage to capture all of the findings presented. Through the expert interviews and iterative feedback from Transvectio’s representatives, additional and characteristics need to be identified. (4) Selecting several frameworks with a variety of factors can aid to identify a wide range of potential challenges. This can be compared to fishing in a lake. To catch as many as possible, throw out the largest net you can find. While this can be effective, there is no guarantee it will be. What could be more effective is studying the behaviour of the fish, the ideal bait and fishing spots. To put this into perspective of the framework, a bottom-up or an evolutionary approach could be more fruitful. How that would be formulated and especially generalized is hard to pinpoint. Innovation projects are very heterogeneous with different challenges and considerations to be evaluated at each time. A framework with a bottom-up approach to capture this heterogeneity would be very hard to formulate. Although, different formulations of frameworks can be explored. A flexible ordering of the framework’s building-blocks, such as performing the partner selection last could produce different results. However, due to the lack of explicit connection between the two segments, similar results are likely to surface. Swapping out theories could also produce contrasting findings. Theorizing if a bottom-up approach could be more beneficial highlights the difficulty of generalization. Some idea can be gained through the application case. The analysis of Transvectio’s case identified several challenges and produced key SFFs. It can not be said for certain that the framework identified all possible factors, as it is far from being exhaustive. If the project progresses and is put into motion, an ex-post analysis could exhibit the efficacy of the framework. How well it managed to identify the real-life challenges that emerge. Even if the framework performed well, it can not be claimed that it is general enough, to be effective for a wide variety of projects. Additional projects would have to be applied to the framework ex-ante and evaluated ex-post.
factors and findings became evident. Arguably, failing to identify these factors and arguments could denote a shortcoming of the CIAF. Even so, one should consider if it is feasible to adequately identify and analyse all possible factors that could materialize, through a framework. It should be accentuated that the CIAF can not identify all possible factors or hurdles than can occur. Rather, the key factors, that either present an opportunity or a threat. But as discussed previously, this can only be confirmed through an ex-post analysis if the project progresses. The CIAF’s focus on innovative endeavours conducted in the private sector could be regarded as a deficiency. With Transvectio’s project being purely private sector based, the choice was made to cater to it. Conceivably, public sector elements could have been integrated into the CIAF from Feitelson and Salomon’s political economy model. Although, that would naturally entail that those elements could not be tested, given that Transvectio’s project does not include them.

8.2 Recommendations for future research

As previously noted, there was a lack of connection between the cooperation and innovation segments of the CIAF. This is a downside of the framework, as cooperation can affect the requirements of the innovation. Bridging this gap between the segments could be a good starting point to improve the framework. This second iteration of the CIAF could then also be applied to Transvectio’s case and the analysis compared to the first one. Finally, recommendations to facilitate cooperation between stakeholders facing these problems could be extended, building on the work performed in this thesis. With ever increasing globalization, both private and public stakeholders have to rely on cooperation to progress and succeed. Furthermore, innovation is a cornerstone in progressing technology and society as a whole. Findings ways to bridge these two forces become increasingly more vital. This thesis might only be a droplet in the face of the pillar blocking this bridge, but with persistence, the drop of water hollows out the stone.

REFERENCES


B.1 PARTICIPANT 1

Below is a transcription of the researcher’s interview with participant 1. The researcher is represented with the letter R, while the participant is represented with P1.

R: Hi, nice to see you, thank you for doing this interview. I must say that currently the success and failure factors might be a bit shallow, since I am still waiting on Transvectio to confirm my findings but I believe the main points are in and not much is going to change with regards to the factors. They are unlikely to change, just become more intrigued and deeper in my opinion. But that are some aspect that I think your expertise would benefit from. I have prepared some questions that I would like to ask you. They are very open ended, very relaxed structure, I just want to get your opinion and start a discussion. Hopefully, I can get through all of the questions, so lets begin. Sounds good?

P1: Sure, sounds good.

R: What do you think about the project overall?

P1: I have glanced through the document, so I do not have a very strong opinion as such, you maybe have to talk me through it a little bit.

R: Sure, did you browse through the problem introduction or just the success and failure factors or little bit of both?

P1: Yeah, a little bit of both, I have a very busy agenda so I have not had the time.

R: So these are shippers, big and small.

P1: Okay, I see, so you have the users of the platform as clients of Transvectio, and you have the rail operators and the perhaps the terminal operators.

R: No worries, so in general, this is about creating a booking platform for railway companies. Transvectio is creating this booking platform, which is similar to booking.com, where you can see every connection, every service that is offered, all in on place. To do so, they have to cooperate with companies in the area, and mostly Oculus, which is the owner of the terminal area.

P1: So when you say that Transvectio wants to develop an online platform with allows clients to see the connections, who are these clients?

R: So the railway operators would also be operators of the platform but also clients of Transvectio if they intend to offer their connections and services on the platform. There are over 30 carriers in the terminal area and Transvectio wants to cooperate with them to have them offer their services on the platform. There is also Oculus, which is the terminal area owner and operator, they service the carriers and terminals in the area, they provide shunting, blue collar workers and equipment, and they hold stakes and own a few terminals and carriers. Transvectio is locked in quite a long contract with them. Transvectio wants to cooperate with them to get use of their network, that Transvectio really needs for exposure of the platform.

P1: Which relationship is bad?

R: So, Transvectio and Oculus, the terminal area operator, they service all the terminals in the area and some of the carriers.
P1: Okay, because to my understanding, Transvectio has a pretty high level of control over one of the terminals in the terminal area.
R: Yeah, they own a terminal and they are serviced by Oculus.
P1: Right, and the role of Oculus is to provide maintenance of infrastructure, something like that?
R: Yes.
P1: Okay, I see, so they want perfect infrastructure, perfect service, and they might not be completely satisfied with how the service operator is working for them [Transvectio]
R: Yes
P1: Okay, so why would Transvectio be involved in this platform, what is the reason, because they are an operator, they have clients, they have a natural relationship with the operators, they are the client of operators, they run their own rail services
R: Yeah
P1: So what is the interest of being involved in such an endeavour, in building a platform, are clients requiring that?
R: Good question, its mostly an idea from one of the managers in Transvectio, and it kind of grew from there, but the main reason is because Oculus lacks exposure, its quite confusing for the clients who to contact in the terminal area, and where to find information, and what the opportunities are of ending up there.
P1: Transvectio as intermodal operator, makes use of that obviously, they have their own terminal there in the area, so to what extent are the clients of Transvectio, lets say decisive in using the terminal or not. So how is Transvectio looking at this. Apparently, they are looking at both options, because I know they are also looking at single modal solutions, where they don’t know if train is used or trucking is used or something else.
R: In this case, for the platform, at least for the initial release, it would likely just be single mode and that is rail, focusing on rail, then when expanding it would be maybe all inclusive with maritime transport as well, but with regards to this single mode transport, it should not overlap in my opinion, because what the platform would offer is just the available connections and available slots and everything that Transvectio would offer through lap, so in this case it should not overlap, or be effected, should it?
P1: Well, I am trying to understand, so if I am a shipper, I can choose to work with Transvectio as my provider of comprehensive door to door service, and that would compete with the platform, where they offer transparency in services, I can just go there and do it myself instead of asking for a comprehensive door to door services, if I truck it to the terminal area myself, I can use the rail services, so isn’t Transvectio then competing with themselves?
R: In a way, in depends, Transvectio would have full control of the platform and if you use their services through rail and you truck it yourself, you never had their business except for the rail in the first place right?
P1: Yes, but that is exactly my point, so here it assumes that clients are already looking for rail, it might be attractive for Transvectio to fill up their trains to a full extent, so you would rather lure customers into rail service that are not necessarily looking for it. So the ones that are already looking for rail, you certainly want to have them, that is not the discussions, but why would you have them self-organize the pre-trucking. I can see how trains can be used by customer who are not necessarily interested in single modal solution, so if they want to have the goods delivered in two days in Scandinavia, they can use rail at their own discretion, and then they might have customers that are interested in it anyway. I was just wondering, what would be the benefit for Transvectio of deploying this platform. I was just trying to understand.
R: So if they knew every information on the platform, they could schedule the trucking and go terminal to terminal by themselves?
P1: Yes, you are empowering your customers to schedule a lot by themselves. Maybe, that is a strategy, I am not sure, but I just wanted to understand if there was some purpose they want to allow customers to organize their own transport.
R: I think, essentially taking business away from themselves is certainly not the goal for Transvectio or other companies that are cooperating. But if that would be the case, some work-around might be found. Maybe removing the exact times and having a drop-off time for the cargo, but it is definitely a valid point.
P1: Okay, it was just a question I had, I was wondering if there was a clear philosophy behind it or not, but okay.
R: Yeah, there is not one at this moment I think. Continuing, have you ever heard about any similar projects?
P1: Similar projects? Yeah, so we actually are doing a project ourselves, it’s not a project about operators per se, it is about the role of booking platforms in logistics, so this is a nice example. We are investigating that currently, more from the viewpoint of the freight forwarder, not so much the intermodal operator, which is here the case. So there are other companies that are doing similar things, but I must admit I have been looking at freight forwarder activities, so there is not necessarily exactly the same, although you might argue that Transvectio, when they offer door-to-door services, they are entering the game as well. I guess they could even do customs. Although, it is a European operator, so in most cases customs might not be such a big thing, but if you transport to Norway, Sweden, there is still something there, and UK certainly now, very soon. So I guess they are also involved in those kind of services. So they might also act as freight forwarder. So yes, with the whole idea of freight forwarders offering platforms similar to this one, well not similar but. You are talking about the offering of rail transportation as the commodity on the platform, where in the case that we have been looking at, is more comprehensive logistics solutions, door to door to say, like a freight forwarder would offer.
R: In the end, I think the final goal of the platform would be that as well. Offering door to door, or whatever type the client wants. Also all the services, shunting, plug-in, whatever the client would need essentially.
P1: So I could imagine that this platform is much more based on Transvectio as a terminal operator
R: That was originally the thinking, but as it has expanded and becoming more clear, it might even call for a joint venture, with companies that are willing to cooperate.
P1: Maybe they are trying to compete with the other terminals in the terminal area.
R: They are.
P1: So maybe that is the reason they want to do this, because they want to lure customers away from other terminals to their terminal, and connect them to their rail services.
R: It is also that part, but I thought it was a bigger part to begin with, and I thought there was more direct competition between the terminals and the platform was supposed to get Transvectio’s terminal more attention, but in the end it is certainly a part of it but not the main goal.
P1: Okay, there are other examples, such as the seaport terminals, that are not necessarily offering platform services but are working on more information exchange with their clients and redefining who their clients are. So like with Transvectio, their clients could of course be freight forwarders and logistics service providers, I know Transvectio is working with main clients such as Volvo, Ikea and other big retailers or manufacturers. Maybe they are also looking for another segment of shippers, like the smaller shippers, that are not key accounts, maybe they want to offer them standard service. That is also something that is happening in the seaport, where port operators, classically are looking for main shippers and freight forwarders and don’t see the main shipper community as their shipper client base. Try to expand that and get it more closer to the cargo level, and maybe
this is true for Transvectio as well. Of course for the very big shippers, they are already working at the cargo level, they understand the product, they know the specific requirements of the shipper, a lot of these shippers are simply anonymous, just steel containers. I could imagine that Transvectio is seeking to get closer to the product, also shippers who have only smaller volumes. And the platform might actually allow them to do that, and to give them more explicit and direct contact with the shipper, easier access to the shipper. Like look if you want to ship three containers a year, we can directly work with you, you don’t have to go through a freight forwarder, I don’t know if they have that but I might advise them also to have a trucking option.

R: Yeah, of course of course.
P1: So one stop shop right. You make use of the terminal, you know how to find us via the website, you can do door to door booking and we can guarantee you within two-three days delivery of the goods and so on. I am trying to think about comparing it with other situations, why Transvectio might be doing this. I think the two possibilities, they might be competing with other terminals, but like you said that might not be the main goal, but they could be that they want to reach out to a larger client base directly, not via freight forwarders.

R: Yeah, and making the experience more clear for users. Who to contact when you are going from Italy to Norway or whatever, who should I contact, why should I end up in the terminal area specifically. I think these are some questions that the average carrier might be facing, specially now with the new Chinese connection via the Silk Road, there is opening a huge market in China and Oculus is really focused on that connection, so getting the new Chinese clients and the new imports is definitely a big factor in growing this user base for the platform. Have you ever heard of the hub’s exposure issues, have you had any experience with this?
P1: I am not aware of the hub having any marketing problems. I think it is not so much the issue that the terminal is underexposed, I think it has much more to do with: are we reaching out directly to our clientbase, do we have the ambition to draw our client base to disintermediate freight forwarders. So, of course you can say it has to do with the underexposure of the terminal, but I don’t have a feeling that is the game being played, so I am not that familiar with that issue. I don’t know what is the utilization of the terminal hub, maybe it is below expectation or not as high, maybe the rail services have problems. I do not know why that is related to underexposure.

R: I know they had a little bit of an issue before the Chinese connection, but after that is has been growing quite steadily I think.
P1: Right, right.

R: It seems like they are focusing on the Asian market mostly, so maybe the Europe market is lacking a little bit.
P1: But I think for the interest of the platform, I think from the aspect of the platform it has nothing to do with connecting to the shippers but more of an added value. You can create more added value with the volume, existing volume, irrespective if you are going to grow that volume or not. R: Exactly. Also the obligatory COVID question nowadays. Do you think it will have any detrimental long term effects on the rail freight market or do you think it will get slowly back on track.
P1: Well, I would say on the contrary. I think COVID of course issues, volumes are going down, but that is something, I think that COVID has accelerated a couple of things. It has accelerated e-commerce, accelerated the issues that the retail sector has in general, of course people are not putting a lot of attention of buying a new car at the moment. So that means that they have to hold their breath for a while, the automotive industry is able to postpone their sales a little bit, I think they can do that and that they are going to be okay, because people are going to buy a car anyway. I was already this morning in a traffic jam again, so people are using their cars again so people at some point are going to buy cars again.
Short disruption, a break ensues for approximately half a minute

**P1**: So, I think yes, there is an issue, but what I was trying to say is that rail might be a preferred option because trucking is certainly affected by it. Truckers are reluctant to do international transport, they have to wait at the border and those kinds of things, so they might favour rail services if they perform well.

**R**: Yeah, exactly. This one might be a little bit out of your expertise but I would still like your opinion, if you expect the development of the platform to be resource costly or not?

**P1**: So what do you mean by resource costly exactly?

**R**: So they would be using the IT department they have, so it is essentially just a virtual development they would have to do, but do you spot any extra costs or aspects of this project, development wise or resource wise, that would be more costly or exceed some budget or anything that might surprise the development.

**P1**: Well that is the other side of the coin right? So if we agree that Transvectio is aiming for a larger customer base or direct mediation with a larger client base, it comes with a cost, because you can not entertain a larger customer base without investing in proper infrastructure, so that should be offset by benefits, at least in the longer term. It is a costly investment, you want to develop additional service and that comes at a cost. I am not an expert in the order of magnitude we are talking about, how much booking.com has invested in their IT infrastructure to maintain the customer base they are currently having. They have millions of clients, many millions, so that is an interesting business. They have a relatively small office, serving so many customers. That is the game you are playing, I think that is a natural consequence.

**R**: That is right, and also I think with IT project, I saw a number that usually IT project exceed budget estimations and time constraints.

**P1**: Right Right, but I think the main problem there with budget that they can overspend 3-4 times is the lack of expertise, you need good people. If you are not paying them, you don’t get them. If you pay peanuts you get monkeys. You need to invest significantly into this, since if this is going to be a core business, you need good investments and very good people, that can actually do this.

**R**: I agree, With regards to the Asia-Europe two-way trade that we discussed earlier. Are you familiar with the trade or the connection with Asia.

**P1**: You mean the belt road initiative?

**R**: Yes exactly. Are you expecting to grow in the following years?

**P1**: Yes, yes. It will grow. It is at least what I expect. I have also been involved in a European project, the Planet, which started June 1st. We have partners such as Costco, Samsung, amongst others. X is also involved and we want to look into the opportunities of this new trade route, and how it connects with the existing network.

**R**: Do you think the freight transport market, and specifically rail in this case, is open to new and emerging innovations? Or do you think it is hard in this case?

**P1**: Well, one of the things we are looking into, if it is possible to introduce new technology, such as blockchain, and making digital connectivity next to physical connectivity. To what I have understood, people in this trade still use telex. Can you imagine?

**R**: Telex? What is that?

**P1**: Yeah, that’s what I am talking about. It is a very old technology, no one has Telex any more, but apparently people are still using it in this trade route.

**R**: Ah yeah, Telex, wow, I have not heard that name in a long time.

**P1**: Yeah, that is twentieth century technology.

**R**: Yeah, and from my first hand experience, shipping companies are not very progressive in their IT development and their software usage.

**P1**: I personally believe that blockchain could be the solar-power of the communication channel, because some places where there is no existing infrastructure, the
new de-centralized technologies can have an advantage of not relying on existing infrastructure. Block-chain works better than classic interorganizational system, because you don’t have the basic infrastructure to maintain, compared to let’s say, classical interorganizational information systems, like shared databases.

R: Do you know the status of block-chain in transport at the moment?

P1: Well of course there are a lot of pilots, and one of the main pilots is Tradelens, which is maybe going beyond the pilot phase at the moment, a lot of international shipping lines have joined the effort, and as far as I understood, the reefer base is now being covered, in using block-chain technology. But I don’t have hands on experience in what that exactly means, in maintaining true information sharing in block-chain, how that scales up etcetera.

R: Okay, can you think of any ethical or moral concerns in the development of the booking platform?

P1: Well obviously, if you compare it to, I like to think about transportation platforms where services are offered, as Uber type of platform, or booking.com which is also a good comparison. It depends on how you look at the individual carriers. Some carriers might be marginalized in offering a commodity, not having an important stake in the market any more. On the other hand, think about hotels that make use of booking.com. Most hotel chains are also rather empowered, and they will just start a multi-channel strategy where they say: “Look, some of our hotel rooms are reserved on booking.com but some are booked on key account, so some clients that use our services can reserve rooms through a private channel”. They don’t have to go through a booking.com. And you know this from first hand experience. If everything is full on booking.com, you can give them a call and check if they have any rooms left. Barge operators, rail operators could operate in the same way, they can do a multi-channel marketing strategy, making use of the platforms, but certainly not forget about their own channels.

R: I think that will certainly always be the case, they won’t stop selling on their own website or whatever channel they use, but it’s also reliant on the exposure the platform will get and how popular it will be.

P1: Yeah, and of course, so if you have a business to business market with a few players, so if you talk about intermodal services, you have freight forwarders playing a role, you have not so many to not so many markets. But, as soon as you start departing from that and start creating a larger customer base, you create a near consumer market, you create a market where the demand side is much more of a perfect market, and then you have to think about market segment, and you start treating your clients in a different way. If the same holds true for the supply side, then you would get a marginalization, as you see in the Uber situation, where taxi drivers might have a hard time building their own channels.

R: Discussing the potential carriers that would be unwilling to cooperate, because they might see the platform as a threat to business. In most cases the choice of carrier is clear due to criteria such as availability, price, frequency of departures etcetera. But it can be hard to answer with no knowledge on the amount of direct competition between the carriers.

P1: I would wonder about a couple of factors that play a role here, if the platform brings new business to the hub, then obviously the carriers will also have an interest in making use of the platform. If the platform only shifts business, between port terminals in the area, then obviously some of the carriers might see it as a bad approach. They might need to re-negotiate with the Transvectio terminal to hold the business. If they can avoid that they will certainly not be a part of this. If the platform is only shifting business within the terminal area, I can imagine that the associated carriers in the terminal area might not want to be a part of this.

R: Sorry, so you mean that platform would be shifting business away from them and into the platform?

P1: So, if the platform has the effect that some of the volume moves away from competing terminals, towards the Transvectio terminals, then carriers will also be
affected in a negative way, they will be services another terminal in these services, and they might be forced to work with Transvectio more intensively and they might not want that. Because they might have a bad position in negotiations and so on. So why would they be a part of that development.

**R:** It still might give them an incentive to join the platform if they see that the platform is shifting volume away from them.

**P1:** Yeah but if they don’t collaborate and join the platform. The platform is subject to network effect, only if rail operators join the platform, does it really become effective. So if too many will boycott the platform, it won’t become successful.

**R:** That is exactly it.

**P1:** So that would be a powerplay between them and Transvectio. Just to give an example, with numbers, let’s say the carriers have 80% interest in other terminals and 20% interest in Transvectio’s terminal, at the moment, they might feel “I am not going to put my 80 percent at jeopardy, just to see what happens with my 20 percent.”. So, if he is shipping for a particular shipper, 100 containers per month, via terminal X, and know the shipper moves to the Transvectio terminal, the shipper is not sure that those 100 containers will rest with them, so they might loose their business. I think those kinds of shifts, how will the platform actually impact the market, will it shift, will it grow business? That will actually determine how rail companies look into that. I think the extent of competition between rail operators will have some effect on that, because they loose business to another rail operator. But I think between the competition between the port operators might be even more important. I agree it is a complex market, you have all these actors competing, you have a more extensive customer base you are talking about. So for example, if you ever start working directly with the port operators, like Transvectio, they disintermediate the freight forwarder, maybe the freight forwarder has a preference for carrier Y, so you are redefining the market and I can see how that can be complicated. Even though you can not completely estimate how it would pan out, you can defiantly make some statements on how that could emerge.

**R:** Yes definitely, also talking about this, what if the platform was some sort of a joint venture between Transvectio and other companies and it would be a separate entity. Given that it would be making enough money and being successful enough that Transvectio could ignore the shift away from their terminal if that would be the case, if other carriers would be more attractive when using the platform.

**P1:** Yeah, I can see your point. This is an interesting one, I think the role of Oculus comes into play here as well. We have seen the same discussion in X, where the question was at some point, would the port authority be in the role of offering a booking platform. If you talk about a port wide booking platform, then the question is a little bit, is that level of cooperation possible with the competitors, and what is the role of port authorities in that. That is an interesting but difficult discussion. Only if you believe that the platform could grow the business to such an extent that competition between port operators is not significant, there is mutual benefit for everybody. Then this could be possible. It also depends on historical developments. In X we see fierce competition between the operators due to new entrants, so you have fierce competition because market volumes are developed between those parties. Fortunately, for everybody there was an overall growth, so if you have overall growth it reduces this fierce competition and makes players more open for collaboration. Because that's what it probably needs to be right? Or you could have a complete new entrants, like Google entering into terminal area and saying “we are going to offer a platform and you would just be users of the platform and not co-owners”.

**R:** Yeah, exactly, it’s also answering this question if the joint venture would entail everyone having co-ownership or, but it’s likely going to be Transvectio being the owner and other players being smaller players within that venture because I fully expect Transvectio to want to retain ownership over the platform.

**P1:** If the market share of Transvectio is less than 20%, then they don’t have a
natural position in having a very dominant role in the platform. They might have a strong role in the IT development, but yeah okay. They don’t have a natural position I would guess.

**R:** There is also this problem of having other companies joining the platform, is how do you make the platform neutral. And if Transvectio is going to charge commission for using the platform. Can you think of any other aspects they would have to agree upon when entering negotiations?

**P1:** Yeah, this is also why I mentioned terminal authorities, I think that the neutral platform makes a lot of sense, otherwise if the owner of the platform is also a participant in the market its going to be very difficult. At least it should be a joint venture between the parties, but I think that is what Maersk tried with their platform, Cosco said: ”no we won’t join we will make our own platform”. You have alliances that can share the capacity and similar things will happen with the platform, I think it would not maybe even be legal to do that, you would have to look at regulations before hand.

**R:** What in your opinion is the greatest barrier or hurdle in realizing a successful platform?

**P1:** A part from everything we mentioned is what is the platform actually bringing to market?

**R:** So it needs a clear goal or value?

**P1:** Value proposition. It has to have value proposition for its users. It might also work against them.

Participant ran out of time and had to leave. Greetings and goodbyes ensue.

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**B.2 PARTICIPANT 3**

Below is a transcription of the researcher’s interview with Participant 3. The researcher is represented with the letter R, while the participant is represented with P3.

**R:** What do you think about the project overall?

**P3:** I think the idea is very interesting, I wonder if it’s really feasible and that is because there are quite a number of proofs or initiatives that are comparable. Such as port based systems, I also know taubooker, maybe you are familiar with that one?

**R:** No, I am only familiar with synchronet

**P3:** Okay, its also on the internet. taubooker with double o.

**R:** Is it t-a-u booker?

**P3:** Yeah, it tries to fill empty spots on barges. But also that is not really taking off, so lets say there is quite some proof that it is not working. Although, I think the idea in itself is very interesting.

**R:** I have heard that these pilot projects that are doing similar functions, they really lack private interest, financial interest. They have all been quite experimental and rather creating the software and nothing goes from there with regards to private investment and exposure.

**P3:** Yeah, but what people tend to forget is, I think, at that is also one of the problems, making the system is not for free. Although, lets say initially there might be people willing to not be paid for making the system work. But in the end it’s only going to work if they are going to be paid.

**R:** Definitely, but I think in this case, Transvectio should have the resources they need to create the platform.

**P3:** Yeah but it’s funny that you say that it’s a good thing. That’s true on the one hand but it can also be a bad thing because people or companies do not want to
cooperate with them.
R: Yeah exactly, exactly. I agree, that is definitely one of the big challenges, getting them to cooperate.
P3: So, I really like the idea but maybe the time is just not right, currently. I don’t know.
R: But do you think there is urgency at the moment or do you think they should wait for a better opportunity?
P3: What do you mean with urgency and a better opportunity for whom?
R: For Transvectio, do you think the idea is not feasible at the moment or just not at all? Like, would it be better to wait three-four years and then explore the idea again, or is it in general not feasible?
P3: Yeah, I think it’s difficult to predict when the right timing is. I can not predict when the right timing is, if it’s a half a year from now or four years, I don’t know. Take the example of the mobile phone, I think it was on the shelves for ten or twenty years and know we can’t think about a life without a mobile phone. Also with electric cars, that is also about 10 years old. So I do quite a lot of work in innovations and it’s very difficult to predict. But lets say the idea itself, it carries a lot of good characteristics, it looks for efficiency, cost savings and it improves. But there are a number of problems on the table that must be solved. What you usually see with these systems is, what you actually should do is keep it stupid simple, but now people are adding more things, making it more and more complicated and more and more expensive. So, simplicity of the system is crucial and next, I think, financial feasibility. I think in most cases it is ignored and people say: “okay, it leads to cost savings and it’s going to finance itself”. But it’s not. Because that has been proven. So, a financial model is crucial. There are costs to the system and there are benefits to the system and these must be at least zero, and preferably positive. But if there is not a financial model to the system, it’s not going to fly.
R: I think it also would be hard to calculate. Because the platform essentially assumes for growth and for financial gain, it has to get new clients, so it could shift business from one company to another one that is using the platform. The connection with China, hopefully the aim of the platform would be to capture that incoming freight. Also there is also some exposure issue with the terminal hub. If I am a shipper and finding a carrier, it is quite hard to know who to contact and the benefits are of ending up there, and who should I talk to for services and connections and everything. So the platform might be something to alleviate that issue. Continuing with the questions. Have you heard about the terminal hub’s exposure issue before or are you familiar with it at all?
P3: Well, I am quite studied in intermodal freight, so maybe I am not the right person to ask this.
R: What about COVID, do you think it’s going to have any long-term effects on the rail freight market?
P3: It depends on how the virus develops. I think in the end there will be a vaccine or a medicine and people will take it or be forced to take it and then things might go back to normal. On the other hand, maybe that is more about expectations or the future. I think this will start to happen more often because there are just too many people on earth. And in China they are not very good about hygiene and they are not keeping the rules very strict. So, I think there is more to come. But let’s say that is my personal meaning. And for now, lets say, if this materializes, I think maybe quite a number of people died, especially weak people [sic: with underlying diseases and older people]. Lets say if the death rate would go up or if, lets say, what you hear is people that have gotten the virus, they have a really bad recovery, and maybe they can not be normal for the rest of their lives, so maybe if that happens, maybe 5 or 10 percent will be taken out of the demand, so that will have a lasting impact.
R: Yeah that’s true, do you think that could threaten the New Silk-Road connection to China in any way?
P3: No, not in particular.
R: So no like, actual reductions in freight, to and from China due to COVID?
P3: Not any more than other connections. Lets say if people stay sick or get sick, if that would hit 10 percent of the world population, the total demand of the world would go down the same and the Silk Road would be hit. But I think there is nothing particular in that respect on the Silk Road.
R: So, this might be more of a difficult questions, but we talked about the platform being resource costly. Do you expect it to be resources costly, given that it’s quite simple in development?
P3: I would say yes, because, lets say, those other initiatives that failed, or are working on a very low profile, they have proven that there are problems on the table, and I think especially resources is one of them. If you are talking about the platform, what we often tend to forget that companies need to connect to the platform, and it’s not like plugging in something and then it’s working. You really have to change your systems so you have to hire a guy or hire five guys that have to make the connection work, and it’s not just the connection it’s also the maintenance. So the platform itself is costing money, but also making the connection with the companies and maintaining the connections.
R: Exactly, and the companies would also have to be willing to change their connections and pay something to be willing to adapt these connections. Also from my experience, freight companies usually don’t have the most up to date infrastructure, or IT infrastructure, so that might be an issue, I agree.
P3: So, it would be interesting for example, to look into some of these failed initiatives and get an idea of the funding costs for example.
R: Definitely. The initiatives i have seen they have been similar. But, like with SynchroNET, it’s a similar idea, but it was much bigger and not as focused on one mode or one particular characteristics. I am not sure about taubooker, is it similar in operations as this idea? Is it trying to do the same things?
P3: My feeling would be yes, although, lets say taubooker focuses on empty spots on barges that they try to match with customers. Maybe this rail initiative goes a bit broader. But I think the way of thinking is comparable.
R: And do you know if it’s a private initiative?
P3: Yeah, Yeah
R: From a carrier or someone else?
P3: From a guy
R: Okay, Okay. With regards to the Asia-Europe connection, through the New Silk-Road, do you expect it to be growing in the following years?
P3: Yeah, the Chinese want it to grow, so then it happens.
R: What about infrastructure limitations, do you think that might be an issue?
P3: I think those issues, they start once you pass the Chinese border towards Europe.
R: Do you think that would be a limiting factor, do you think it’s growing or expanding more than the infrastructure can handle, the railway?
P3: That depends on the country, I would say, if I take it from the Dutch situation, what you see is here for example, the policy makers say: “rail transport is so important and it should grow fast. If we can do anything, let us know”. But then, if you want to develop something, there is no money, no support. I was just in an advisory board for a rail freight terminal and the national government said: “yeah you can not go the route you are aiming for but now you have to use the Betuwelijn.” So, in the Netherlands, the only space available is on the Betuwelijn. Passenger transport has priority and I think that holds for all the countries in Europe. So, rail freight is nice but yeah, that’s it. In my research I have also looked into past investments in rail freight transportation or intermodal transportation, for the Netherlands in particular, and it is almost zero.
R: Do you expect there to be a mode switch in the coming future, towards maybe ship or air, or something else?
P3: Yeah, that depends, let's say for now, we are looking towards a huge economic crisis, so volumes are down, they are severely down, so maybe in the coming years, the capacity issue is not big of a problem.

R: Okay. Do you think the freight transport market, and specifically rail transport, is open to new and emerging innovations?

P3: Yeah, I think so. Having said that, I think it's also very difficult to innovate.

R: I have seen a few papers, one from a TU Delft professor, where he was comparing the success and failure of mostly physical innovations, such as terminal innovations, improving loading and offloading and a type of folding containers but there was not a lot of virtual innovation, as in being software focused, so I am thinking, the freight market is quite crude, and you don't really have that safe space for innovations, but with software, it feels like you can more easily push it, because it's not forced in there, it just appears and it's either used or not. So do you think that might have a positive effect or not?

P3: Yeah but you say you are not going to force the platform or not, but in the end you are also forcing the platform, because you are requesting customers to invest in connecting and in maintenance. But let's say, I think the rail freight sector is very capital intensive so you have very long-lasting lifetimes. I see many initiatives for new wagons or for new innovative wagon types or so, and then I am always asking those companies or persons, who are willing to prepare this or make this: "Whose going to buy this from you and for what reason?" And quite often they have not thought about that. But this is the most important questions because if you want to sell something, you need customers. If these customers have wagons that last for 50 or 75 years. You need to have very good reasons why they would switch to your wagons. I also did research on innovations on rail freight terminals, in the past. Might also be an interesting paper for you by the way. I think it appears in 2005 or 2007. But if you type my name on Scopus you might find it. Are you familiar with Scopus?

R: I am, I am.

P3: Okay so just type my name and go back to 2005 or 2007 or so and you will find it. Also there, there were about 120-125 innovations especially aiming at changes at railway terminals. In the end almost none materialized, because they either too expensive or one of the big problems was also that the improvements were not big enough, or the suggested improvements were only taking effects on the terminal and not having any impact on the chain, while being more expensive. So you have to take into account a lot. And of course better software, or trying to bypass all this physical stuff, it can certainly be helpful, but also it's not the magic word or so. If you take a look at for example the American rail freight carriers, they are much more efficient, I don't know exactly what system they have, but I know they have much more metrics and much higher performances, and of course they have longer trains, double stack, so they have more advantages. But they are just more efficient.

R: Do you think that is maybe a bigger issue with European trains, that they are not efficient enough?

P3: I think in the end they are not.

R: And just the system as a whole isn't?

P3: No.

R: Can you think of any ethical or moral concerns in the development of the booking platform?

P3: I can't think of any now.

R: It's more of an obligatory question since I think TU Delft is very focused on ethics and morals.

P3: Yeah, certain people like the subject, I would say.

R: So, now we are back into more specific questions. Have you finished reading the preparation material?

P3: Yes

R: So, with regards to carriers offering their services on the platform, displaying
their connections, they might be scared of essentially their customer base shifting from them towards a competitor. But the information from Transvectio has revealed that only a small percentage of carriers are in direct competition, only around 10 percent. I am not sure if these are large carriers or important ones, same with the volume. It’s a strange number but I am assuming the direct competition is quite low. But due to the competition being low, it increases the chance that other carriers are willing to cooperate and join the platform. However, getting exposure for the platform so that clients know that it exists is a big challenge and Transvectio is quite sceptic about it’s commercial capabilities. It would also be very costly to advertise it’s platform. So, do you think attempting to cooperate with Oculus and other carriers, before the initial release, is the best approach to combat this issue? As in, on the contrary, cooperating before the initial release.

P3: To be honest, I do not believe too much in cooperation in this sense. I think it can work, but then it should fly by itself, like Thuisbezorgd or Uber or other successful platforms, booking.com. It should be able to fly by itself. Because if you have to cooperate, you have to compromise and then it’s not going to work. There are a lot of issues on the table and then you end up in discussions about who is going to finance what, who is going to get benefits, which advertisement are we going to make, are we going to share our data or not and stuff like that. And these phases have also occurred for other initiatives like taubooker or other systems, platforms. So far, they haven’t been able to become a success.

R: Yeah, so like with Uber and Thuisbezorgd, they are the owner of the platform and for other companies to join and offer their services on the platform, it does not cost them anything but provides additional exposure for them. In this case, there are quite a few factors, like you said, with regards to the platform neutrality and commission fees and everything. But, lets say, if the companies just see the platform as being value adding, and they don’t have high investment costs and that it’s better to join the platform than not, do you think that’s the only plausible approach for a successful platform?

P3: And what exactly to you mean then?

R: As in, if there is difficulty in cooperating, and the only reason to join the platform is that it’s better to be on there than not, and that the companies think that they are going to loose something or that it’s going to be risky to join, do you think they will refrain from considering to join?

P3: Yeah, that might be difficult to tell, since it might be different from company to company. I think it would be good for this kind of a platform that you take it form the positives. Like Thuisbezorgd. Companies want to be on that platform, and they want to have exposure and the additional business. For transportation that is much more difficult.

R: How so?

P3: It can lead to loosing business. Because, transportation is a commodity. Thuisbezorgd is not a commodity because you have choices connected to quality and price. For transportation you want to go from A to B. This options costs 10 euros and this one 9 euro, so I take the 9.

R: That’s also the thing because the freight business is really quote based. You could not display the prices on the platform because the companies would just outbid each other and smaller carriers can’t compete. Since the direct competition, the carriers offering same connections from A to B, is quite low. In most cases you would likely have one option, but in others two or three and then you can ask for quotes. Depending on the customer, they can offer better quotes and the customer can choose the best price or what other criteria he is thinking about. I feel like that might be a benefit of the platform and not a negative effect.

P3: Then the question is, the benefit of whom? Because its not in the benefit of suppliers to have their prices being put all over the place. Maybe that is also the important reasons for their existence [quotes], that their prices are not so transparent, and they get to bid on certain parts of transport or so.
R: What would be the difference of being a shipper that contacts three carriers for a transport from A to B and I ask for quotes, instead of just doing it through the platform.

P3: That is personal and the platform is not personal.

R: It would be personal, so the platform would only send the quotes to the client, not display them for everyone to see.

P3: Yeah, maybe. To me there is a very intriguing questions, why are these platforms not working?

R: Yeah, that is a big question. I have not looked too much into it, but I was told that a lot of these platforms were funded by the Horizons 2020 EU subsidy project. Due to a lot of these pilots being unsuccessful, the project was considered a failure and they are not changing it or stopping it. But these pilots really lacked private interest or private investment, which I do not believe is an issue in this case, do you think there is more to it than just the missing financing, or that they are just unsuccessful as an idea?

P3: Like we discussed before, the finances have different aspects. What is also always important is, what is the problem? Or who is dealing with a problem, or who is the problem owner? In this case, there is not really a problem owner. Okay, you can say the EU is the problem owner, or a country, or Oculus. But with a problem owner, I mean a competitive private actor that has a personal interest. This is very important, in these cases with the pilots and the other port systems, they have been developed and pushed by the port authorities, but they are not really the direct users of the systems, nor the direct actors having a problem. With taubooker, it is still operational but it is not really growing fast, I am expecting. It is a private person who is doing this own his own account, maybe with a small investor onboard. With innovations it’s always very important to think who has a problem, or who is the problem owner, or who is willing to invest in it. As soon as a problem has a kind of a public ownership, then it is not really a real problem.

R: What about the public ownership being in this case the exposure problem of Oculus? And Oculus also finding that this might be a solution to this problem, if they are really dealing with an exposure problem.

P3: Yeah but Oculus is not really a fully competitive commercial actor.

R: What about Oculus, the port operator, as compared to other large hubs in Europe.

P3: That is true, but what is their problem then?

R: That they are not getting enough business, compared to the opportunities of ending up in the terminal and using it as a hub, compared to other hubs around.

P3: Yeah that can be true but the platform is only one of the solutions. There might be better solutions, such as going to the prospective customers, asking them to do business there or offer them discounts or land or whatever. What I mean with problem or problem owner is a really someone that has a problem or a company that has a problem, that needs to be solved.

R: Yeah, that is really not the problem is this project, I agree. It is more of an added value project, rather than trying to solve some issue.

P3: What I have learned from my studies in Innovation, is that it rarely a good sign, if you don’t have a problem owner.

R: Like we discussed before, these factor with regards to the platform and the carriers. The neutrality of the platform, commission fees and not displaying prices. Can you think of any additional factors they would have to negotiate or agree upon before joining the platform?

P3: You mean companies?

R: Yes, do you think they might be sceptical in sharing something or something that might present an issue?

P3: What you always see is that they are not very willing to share data. Other issues are for examples the divisions of benefits, division of costs if investments need to be made.
R: What about, hypothetically, if carriers share all of their information with the platform, such as availability, empty slots, time schedules and every info they have, could that be used in some way against them by competitors. Such as mapping up weak areas?
P3: Yes, certainly. You are not going to expose your whole business to your competitors.
R: Do you know specifically what information that might be. What could they display on the platform?
P3: In principle, they could display anything, but in practice, I think they are willing to display as few as possible, that is a bit the balancing act. One of the core issues might be, that in the basics, transportation is a commodity. What companies try to do, in the end, is atleast give the customer the impression that it's not. If the platform is going to fully work, it is going to show this commodity. It is going to be very simple, very to the point, we transport from A to B, with these conditions, with these suppliers and these prices so please choose. I think in the end, it's not going to be for the benefit of the suppliers because they would have to go out with their full information.
R: Can you think of any specific carriers or companies that are absolutely vital to have on board and willing to cooperate.
P3: Ideally, you would like to have them all. I think it’s very difficult to tell who would be crucial to have on board. There are so many decision variables on the table, they don’t want to share data, some are to small to be included, other are maybe not fully private. There are all kinds of arguments on the table. With these kinds of lists, usually you just have to be very happy with the companies that want to be on board. The issue does not necessarily lie with who is on board, but really make the concept work. Crucially for me, it should be making it so appealing so customers say “yes I want to use this”. Like with Thuisbezorgd or Uber where people say: “hey this is good, I want to use this”.
R: Compared to the usual approach in booking freight transport, such as using a website or you give someone a call. That is the approach I am used to, I am not sure how it is in these larger hubs. It is quite old right? Usually, occurring clients that book the same transport over and over again, they have usually a connection with a representative at a carrier and just book consistently through them. It might be hard to get these established clients to connect to the platform, and the companies that have these established clients would unlikely want them to. It is more of a targeting of the newer clients, like those from China.
P3: Yeah, I think so. Maybe it’s also the case that these existing relations, they have already been established with an individual platform between them. I have received some data from transport companies or terminals and these are very specific format. So if a terminal operator has certain systems and someone tells him we can do business. I can do it maybe one euro cheaper per container, but you have to invest in this and this system and change this and that. The operator can think well I am terribly busy and I don’t want to spend money.
R: Yeah very true, when you are accustomed to something, it’s hard to break the habit. If the platform would take flight or if Transvectio continues with the project, there is the option of creating a joint venture, where a coalition would be formed with cooperating carriers and Transvectio. Or they could create a separate entity, with a purely dedicated team, that would handle the platform operations separately. Separate from Transvectio as a carrier and terminal operator. Do you think these approaches are plausible or should Transvectio just keep the ownership in-house?
P3: I would do it separate.
R: As in a purely separate entity?
P3: Yeah, it’s so different and you need different people to think about this in a different way. If you want to keep this in-house it gets into all kinds of politics. If you want to maximize your chances, it should be placed outside of Transvectio.
Of course they can own it or do a joint venture, but like I said, it should become something like: “hey this is nice, we should use this”.

R: I agree, Also with the conflict of interest, Transvectio would likely be the owner and the largest financial banker of this separate entity. So if there is a decision that has to be made where the benefits of Transvectio are weighed versus the benefits of other carriers, the decision would always likely be on Transvectio’s side, since they are the owner. I think it would always be hard to create a purely separate entity, but I think that is the best current approach.

P3: I fully agree with that but in the end that is up to Transvectio. For example, take Philips, they have spun of quite a number of successful companies. ASML has been spun of from Philips and become quite successful, being number one in the world in lithography machines. Couple of years ago, lighting has been spun of and since then has developed into something much more sexy than it was. So you need fresh people to do this. If they don’t want to, they don’t want to but it decreases the success of the platform.

R: What do you think is the greatest hurdle or barrier in realizing a successful project? We have talked about several challenges but do you think one is bigger than the other?

P3: Money. I think it is very simple, like we discussed before, I think the costs of making the system are ignored, the costs of connecting the platform to the companies for their data is ignored. I am not aware of any cost calculation that looks into these subjects. Running the platform costs money and maintaining the connections costs money. I have the feeling that these numbers are significant and maybe up to large. And they are ignored. People just continue to talk about platforms and their huge prospects without thinking about monetary consequence.

R: I think that definitely has to be done before engaging in any significant development.

P3: So we really need to know what the costs are of such a platform. Then we can right away see if this leads to a business case or not.

R: Lets create a scenario, in the best case possible, where all the important carriers would be willing to cooperate and you get a really good kick-start with the platform. When negotiating with these carriers, and you explain to them the idea and they all seem to love it. Then suddenly, one of the companies steals the idea and releases a platform before Transvectio does. It is this issue of having started development with sunk costs, before negotiation with the carriers and getting their answer, to avoid the stealing of the platform. Then you already have sunk costs but you are unsure if carriers are willing to cooperate or not. Do you see any way of bypassing that or do you think it’s just a sunk cost for trying out the project?

P3: No, I think that is a part of the game, you can not bypass it. I also know from cases with Facebook, where they had trials, you have trials all the time between companies for patents. The best way I think to prevent it is just to create something that works. And if a company says, hey this is nice I need to use this, like with Thuisbezorgd and Uber, that you make is so appealing and so good that it will attract customers automatically.

R: Yeah, so it’s about finding that attractive factors?

P3: Yeah, and I also think it might be hard for some carriers to copy it because they are not neutral. It’s often also claimed that the neutrality of these platforms is quite an important issue. Thuisbezorgd is neutral for example, it’s not owned by McDonalds.

R: Yeah, I think in the end the platform would never be completely separate.

P3: Yeah, but they should try to have it that way.

R: Definately, I think that is the only viable approach. Alright, I have finished all the questions. Thank you so much for doing this interview, it has been very helpful.

P3: You are welcome, it was my pleasure, interesting subject.
C

SUMMARIZATION OF THEORIES

C.1 ALVES & MENESES’ PARTNER SELECTION PROCESS

It is well recognized that firms seek additional resources and knowledge through their business networks once their activities surpass the internal expertise or resources they possess (Tomlinson and Fai, 2013). Reaching these additional resources has been suggested to increase the innovative capacity firms have to offer (Georghiou, 1993). However, cooperating with other firms can create dependence, which risks opportunistic behaviour, reducing the innovative efforts of firms (Williamson, 1985). Therefore, the need for strong and close-knit ties between the cooperating partners is needed to minimize the sub-optimal behaviour, usually achieved through social norms and solid codes of conduct (Tomlinson and Fai, 2013). Solidifying credibility and reputation in the business network is therefore of high importance for continued and effective cooperation with partnering firms and future cooperative efforts.

When engaging in co-opetition, cooperating and competing with firms at the same time, these relations become more complex. The term was coined by Raymond Norda in the 1980’s and is a philosophy or a strategy that attempts to attain the benefits of both competition and cooperation (Luo, 2007). Co-opetition is viewed by some as perilous, with Quint (1997) describing this relationship as “sleeping with the enemy” (Alves and Meneses, 2015). These forms of partnerships aim to work together towards a common goal in a certain market domain, by sharing resources and knowledge. Concurrently, they improve their own performances in other domains through independent action (Luo, 2007). A well known example of this strategy is the co-opetition partnership between Sony and Philips, with the development of the DVD player. They then competed in the sales of DVD discs. In order to manage this paradox of competing and cooperating at the same time, partner selection must be carefully performed.

Choosing the correct partner is of the essence as many incentives are in place for sub-optimal behaviour. The right selection of partners is regularly regarded as a detrimental factor, being one of the most important for a successful business partnership (Geringer, 1991; Shah and Swaminathan, 2008). Alves and Meneses (2015) identify that task-related and partner-related aspects of the partner selection criteria has been grounded by academics, but infer that “It seems that there still remains an absence of an unifying theory capable of explaining partner selection process as a whole in strategic alliances in general and in co-opetition in particular” (p. 96). In order to close this gap of knowledge and attempt to gain and understanding of the selection criteria in the choice of partners, they formulate a partner selection framework. Studying four successful cases of long-lasting partnerships in three industry

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1 Complementary products or skills; financial resources; technology capabilities or uniqueness; location; marketing or distribution systems, or established customer base; reputation and image; managerial capabilities; government relationship, including regulatory requirements and government sales; help in faster entry into the target market; and industry attractiveness. (Taken from Das and He (2006) p. 126

2 Strategic fit or interdependence, or compatible goals; compatible or cooperative culture and ethics; prior ties and successful prior association; trust between top managers; strong commitment; similar status, including size and structure; reciprocal relationship; commensurate risk; and ease of communication. (Taken from Das and He (2006) p. 126.
sectors, their analysis found that prior personal relationships were present in all cases. These prior relationships were often the result of family or friendship ties or previous business associations. Shared business networks were also an important factor, where positive experiences from previous interactions facilitate the spark for partnerships, and highlight the significance of trust when selecting partners. Similarly, shared vision and ease of communication were considered vital facilitators (p. 101). A conceptual framework was then formulated based on the results of the study, seen in Figure A1.

Figure A1: A three step model for partner selection (taken from Alves and Meneses, 2015)

Once a firm decides cooperation is needed to further their goals, decision-makers set to identify the potential group of viable partners. This is argued to be an unconscious process, forming a group of potential partners, limited by the connection network of the firm. This unconscious bias might exclude viable partners, when information on trust or image is lacking and no ties or relations have been formed. From this group of potential partners, a careful selection takes place, based on prudent criteria such as strategic fit, access to resources or specific technology, market penetration or risk related criteria. This creates the viable group from which partners are selected (p. 103).

When no systematic and conscious selection of the available partners is accessible, this unconscious bias comes into play, where trust and previous relations are of the essence. However, when dealing with larger firms bolstered by a well-grounded reputation, it could help to remedy the lack of trust when information is missing. However, these findings should not be generalized to all co-opetition partnerships, as the cases were selected on previously established domestic partnerships. The goal is not to come to the conclusion that previous successful cooperation or personal ties is a prerequisite for the establishment of co-opetition partnership, but rather to highlight the unconscious and important biased selection that takes place when selecting partners. Rather suggesting previous positive relations can be vital when selecting from a group of partners that meet other task- or partner-related criteria.
C.2 MOLM’S SOCIAL EXCHANGE THEORY

The theory of social exchange emerged through Richard Emerson’s (1972) pioneering work, which placed emphasis on actors exchange networks of social relations and their interactions, rather than their attributes or the content of interaction (Molm, 1994). Moving from the original dyadic relationships, this bridged the gap between other disciplines, allowing sociological analyses of networks between actors (p. 162). Social exchange theory (SET) studies the relations and behaviour of actors that are formed by the benefits and costs they provide in the relationship (p. 163). In any exchange relationship, actors contain resources (such as financial, information or behaviour based) that are valued by other actors. SET attempts to form predictions on the relations between actors, not individual actor behaviours. Focusing on the dependencies that are formed in these relationships, structuring the flow of costs and benefits through interaction, created by the resources actors value (p. 164). In a dyadic or networked relationship between actors, mutual dependence is a fundamental part of all exchange relations, but it can create inequalities due to different status of status, resource control and power.

SET is based on a minimal conception of the actor (p. 164). Actors can be any entity such as individuals, groups, firms, or countries and take different roles, depending on the context (e.g. your father or the CEO of Airbus). Only one assumption is made about actors which is that their behaviour will attempt to increase outcomes they value positively and decrease those they value negatively (p. 164). Note that they might still not seek these outcomes in a conscious or rational way or attempt to maximize outcomes. However, they may behave in a rational way, by exploring alternative options of partners and actions and weighing pros and cons, or base their choice on past choices and interactions with partners, without deliberately weighing pros and cons. The theory does not assume what actors value, it can be financial, social or selfless goals. Therefore, the concept of a value is different for each actor. SET therefore attempts to bypass the focus on actors characteristics, assuming that actors behave in similar ways to obtain what they value, whatever it might be.

The dynamics of the relationships between actors regarding the structure of outcomes can be defined as being: (p. 165).

I Independent, where the actors are solely dependent on their own behaviour,

II Dependent, where actors are solely dependent on other actors behaviours,

III Interdependent, where actors are dependent on some combination of their own behaviour and other actors.

When exchanging in a dyadic or network based relationship, the reciprocal dependence can either be direct or indirect (generalized exchange) as shown in Figure A2. With direct reciprocity, benefits are given and received directly between actors. “The primary effect of embedding dyadic relations of direct exchange in larger networks of connected relations is to introduce the possibility of structural variations in dependence, and therefore in power.” (p. 165). With indirect reciprocity, benefits are not received directly, but rather indirectly between the actors within the group. When the structure of the relationships is built only on interdependent (mutual dependent) relations, the individual actors do not have control over the outcomes for themselves or others, but rather rely on each other to produce outcomes they normally could not perform alone (p. 166). According to Molm, Interdependence is the defining structure of groups [...] Relations of mutual dependence underlie all forms of cooperation in which two or more individuals act as a collective unit, that is, as a group.” (p. 166). These relations are visualized in Figure A3. Within these multi-actor interdependent
networks can also exist smaller independent and dependent relationships between the actors. However, with explicit reliance on other actors to perform tasks or receive benefits one can normally not achieve alone in a mutually dependent relationship, issues and opportunities for sub-optimal behaviour emerge that actors should be wary about and seek to minimize.

Initiating exchange relationships is inherently risky as non-reciprocity can be utilized by opportunistic actors. Different risks face actors, contingent on the nature of their relations. In dependent relationships, actors rely on others to receive benefits. As such, they can produce value for other actors but receive nothing in return. This incentive not to reciprocate is greater in indirect (generalized) exchange, and the risk increases with larger networks (p. 167). However, when actors become interdependent, this risk is reduced since actors’ outcomes are dependent on their own contribution. There is no incentive for non-cooperation. Molm describes this with a fitting example, with the case of two professors co-authoring a book. No incentive exists to take without giving in return, as mutual dependence is in place. Interdependence is the defining structure of groups. Nevertheless, interdependent relationships are not free from opportunistic behaviour. Free-riding can be conducted, where members receive benefits without supplying anything in return. Despite structures of pure interdependent relation-
ships being easier to establish and maintain, they tend to dilute into less stringent versions of themselves with larger network sizes, where chances of non-optimal behaviour, such as free-riding increases (p. 167). Now the question arises of how can actors overcome these risks, embedded in mutual dependence relationships, and engage in exchange relations? Molm raises the same question and argues that the way in which the process of exchange is structured, the relations can be altered to capture the elements of interdependence (p. 167). In direct exchange relations, two forms of transactions are distinguished. Firstly, negotiated transactions, where both sides engage in negotiation to explicitly decide on costs and benefits of the transaction. The relations of outcomes is a joint decision process. Secondly, reciprocal transactions, where actors’ contributions are not negotiated but are performed separately (p. 168). These types of relations are based on trust and develop over time. Actors can offer contributions with future reciprocity left implicit. Although usually, this can create a series of back and forth reciprocation, sequentially contingent but still affected by actors’ separate decisions. As in, the division of outcomes is affected by what actor receives from another and what will be given in return next and so on (p. 169). In economic exchanges, negotiated transactions are unsurprisingly much more common. Both these forms of transactions change the intrinsic risk in mutual dependence relations, albeit in different forms and to a different level. By having actors reach an agreement beforehand or being reliant on reciprocating to receive benefits in return, the structure of the relations is transformed from one of dependence to having elements of interdependence. Negotiations allow actors to explicitly know what they are giving and receiving, avoiding the risk of having the exchange being unilateral (p. 169). However, this does not remove the risk of applying tactics, even unknowingly, that result in less favourable agreements for either party, due to the elements of power and trust.

C.3 Feitelson & Salomon’s Political Economy Model

Feitelson and Salomon’s (2004) paper presents their political economy model of transport innovation adoption. They begin by making the distinction between the penetration and the adoption of innovations. Respectively, it distinguishes between that an innovation has become available, and the actual use of one that has already penetrated the market. The actual use is determined by numerous factors, namely the invention has to be feasible on a technical, societal, economical and political level. The authors mention that perhaps the most important factor is the technical feasibility, that the innovation works as intended and can be applied (p. 11). However, a possibly even greater hurdle is convincing others that it does. Moreover, a demand has to be in place for the innovation or the benefits it provides.

To assess the economic feasibility, innovations are usually evaluated through some form of Cost-Benefit Analyses (CBA). The rationale behind them is to assess if the invention is cost effective and provides benefits greater than the costs (p. 12). If so, the invention will eventually be adopted. Nevertheless, history has shown that despite being technically feasible and cost effective, inventions are not implemented. This can be due to them failing either the societal or political appraisal. From a societal view, the innovative project has to match the public’s perception of problems and how effectively the proposed project addresses these problems (p. 16). Path dependence and past efforts also affect this perception. For the adoption of innovations relating to the public sector, the political feasibility is coupled with the societal one, as politicians, lobbyists and the media can sway the public’s perception. The correct “policy window” is also needed, where crises or political changes
open opportunities for new ideas to be proposed. However, politicians are reluctant to make decisions that can reduce their re-election and campaign financing capabilities. The visibility and location of the project also affects the way politicians will behave towards it. Feitelson and Salomon (2004) present their political economy model in Figure A4.

The model describes the factors and the barriers new ideas must break through before being adopted, and the active agents affecting this process. Although the model is more applicable to the public sector, rather than the private one, it examines a broad range of factors that need to be considered for innovation adoption, namely the technical, societal and economical ones. Taking a private sector view of the “policy window”, it can be seen as being determined not by political but by the societal aspects, previously described, such as the public’s perception of problems and how effectively the proposed innovation addresses these problems. Current sanctioned discourse, morals and ethics also affect this perception.

Hekkert et al. (2007) call for a restructure in the innovation process. They argue that there is a hefty need to influence the speed and direction of innovation and technological change. They look at the innovation process in a holistic sense, where it not only looks at the technology itself, but rather its interaction in which the technology is embedded. (p. 414). It attempts to “analyse all societal subsystems, actors, and institutions contributing in one way or the other, directly or indirectly, intentionally or not, to the emergence or production of innovation” (p. 414). By doing so, it helps shed a light on what kind of activities advance or impede innovation, therefore gaining a better understanding of how the innovation process functions, intentionally shaping it towards greater success. This holistic view of the innovation process being embedded in a system of systems has combined theories, being developed over the last decades. It has led
to the Innovation System (IS) approach. The authors present Freeman’s (1987) definition of IS as being: “The network of institutions in the public and private sectors whose activities and interactions initiate, import, modify, and diffuse new technologies”. However, this network of institutions and systems of systems explains why technological change and innovation adoption is often a very lagging process and strenuous to influence. Hekkert et al. state that the rate and direction of the technological change is impacted largely by the competition between the numerous existing innovation systems. This inertia can lead to lock-in effects that slow the emergence of new technologies. This is due to preexisting innovations, already in place in the socio-economic environment, having grand advantages, such as “all kinds of evolutionary improvements, in terms of costs and performance characteristics, from a better understanding at the user side, [...] accumulated knowledge, capital outlays, infrastructure, available skills, production routines, social norms, regulations and lifestyles (Kemp, 1994: p. 6). This holistic approach is therefore necessary if the goal is to influence the speed and direction of innovations. It is also the main question of the Multi Level Model, which in Hekkert et al.’s terminology is: “what are the conditions that foster the growth of an emerging innovation system in such a way that it becomes so large and entrenched in society, that it is able to compete with and even become part of existing (innovation) systems?” (p. 416).

Hekkert et al. attempt to transform the innovation process with their dynamic innovation system framework. The goal is to systematically map the activities that take place in the innovation systems as a basis for the analysis of technological change. These activities are often called functions of innovation systems, as they attempt to contribute to the generation and diffusion of innovations (p. 415). The functions not only attempt to map the activities from a technological or an innovative viewpoint, but rather from a Technology Specific Innovation System (TSIS) approach. The TSIS comprises the dynamics of different approaches, namely activities relating to a geographical area (as in National Systems of Innovation, NSI) and industrial sector specific activities (Sectoral Innovation System, SIS), although to a much lesser extent. The authors visualize this in Figure A5.

![Figure A5: Relations and intersections between the Sectoral, National and Technology Specific Innovation Systems (Taken from Hekkert et al., 2007)](image)

The authors use an example of the development and diffusion of solar cells to explain the embedded characteristics of the TSIS. The technological progression of solar cells depends on the research of institutes and universities around the globe. This overlaps with the segments of the national sector that focus on the research of
solar cells. National agenda and policy then can affect the diffusion and adaption of solar cells through subsidies, investment and laws. The production of the cells is dependant on the industrial sector which provides silicon. Other industries are also dependant on silicon which can cause rises in the price of silicon, leading to higher prices of solar cells. The application of the cells is furthermore dependant on the housing sector, where a need is for architecture that incorporates them into their designs. Therefore, this embeddedness of the various sectors overlap with each other, influencing the progress, price and diffusion of the technology (p. 416).

Through assessment of literature and several empirical studies, the authors propose the following functions. They are to be utilized when mapping key activities in innovation systems and to explain shifts in TISs. They also suggest which activities should be mapped and how.

**Function 1: Entrepreneurial activities**

Entrepreneurial are crucial for a well performing innovation system. They can either be incumbent actors or new entrants and their role is to utilize new technology, knowledge and markets and business opportunities. The entrepreneurs experiments with treading new grounds entails substantial risk and high uncertainties, but is necessary to gain new knowledge. A well functioning innovation system likely fosters entrepreneurial activities. When lack of entrepreneurial activities are noticed, it can be the cause of deficiencies in other functions. While the entrepreneur might think these deficiencies are external and fixed, this is not the case. Although, he or she should consider how much effort and resources should be put into adjusting and influencing the system versus the in-firm processes and development. Hekkert et al. present Van De Ven’s 1993 formulation of three questions that need to be answered from the viewpoint of the individual entrepreneurial firm: 1) which functions will the entrepreneur perform?, 2) which organizations should the firm link to, in order to perform other functions?, and 3) which organizations will the firm compete with on certain functions? (p. 422). The authors suggest analysis of this function through the mapping of: the number of new entrants, the number of diversification activities of incumbent actors, and the number of experiments with the new technology (p. 422).

**Function 2: Knowledge development**

The authors reiterate that the process of learning are vital to the innovation process. Research and knowledge development is a precondition within the innovation system, where learning by searching and learning by doing are key. The typical indexes for the mapping of this function over time are: 1) R&D projects, 2) patents, and 3) investments in R&D. (p. 422).

**Function 3: Knowledge diffusion through networks**

The main function of networks is the exchange of information. Policy decisions, with regards to standards and long term targets, should be in line with current technology as well as being effected by changing norms and values. Through the use of networks, “learning by doing” and “learning by using” provides valuable benefits. To analyse this function, one can map the number of workshops and conferences devoted to a specific technology topic, and the network size and intensity over time. (p. 423).
Function 4: Guidance of the search

This function relates to the process of selection. Resources are most often limited, so when the choice between numerous technological options are presented, it is vital that a specific focus is chosen. Relating to functions 2 and 3, the process of learning is not autonomous. Choosing a specific direction of technological change, taking into account changing preferences in society and targeting activities that can positively affect the visibility and clarity of specific wants among the users. Public activities can provide legitimacy and influence the direction of technological change through environmental goals, such as an increased share of renewable energy or reduction in emission. Such long term policies provide a feasible target that reduce the uncertainty resource spending. However, this is not only a matter of public or private influences. It is also the interactive and cumulative process of information exchange by actors in the network. Actors are often solely driven by a hunch. Through experiments (function 1) and knowledge development (function 2), the achievements and shortcomings can be liaised to others actors in the network (function 3), reducing the perceived uncertainty. Success stories can also generate momentum for change in a certain direction. The function can be analysed by “mapping specific targets set by governments or industries regarding the use of a specific technology and by mapping the number of articles in professional journals that raise expectations about new technological developments. By counting the number of articles that are positive or negative regarding the new technology development, the state of the debate can be assessed. A strong discussion about the potential benefits of new technology is likely to hamper future developments, while a strong emphasis on the positive aspects is likely to stimulate technology development (p. 424).

Function 5: Market formation

When new technology enters the market, it often faces difficulties competing with existing ones. New technology is out of necessity relatively crude and inefficient, relative to its ultimate use. Compared to previously embedded technology, the advantages it provides may be small or even none. Given these circumstances, the diffusion will naturally be slow. Creating a protected space for new technology, such as through (possibly temporary) niche markets, can allow actors to learn about the new technology (function 2 and 3) and develop expectations (function 4). Public endeavours can also provide this protection through competitive advantages, such as subsidiaries, favourable tax regimes or minimal consumption quotes. This function can be analysed by mapping the number of niche markets that have been introduced, specific competitive advantages for new technologies, and new environmental standards that improve the chances for new environmental technologies. (p. 424).

Function 6: Resource mobilization

Sufficient resources and its mobilization are the basis for knowledge production and other activities in the innovation system. Funds towards long term R&D projects by public or private actors, as well as for experimenting and testing new technology are among the activities for this function. Without sufficient resources, other functions become almost impossible to be undertaken. This function is difficult to map. The authors recommend gaining insight into the perception of core actors, through interviews, if they deem access to sufficient resources being problematic or not (p. 424).
Function 7: Creation of legitimacy/counteract resistance to change

The resistance to change will always be apparent when introducing new technology, specially from parties holding interest in the incumbent technology, opposing this “creative destruction”. Advocacy coalitions can be the motor for change; “they put a new technology on the agenda (function 4), lobby for resources (function 6) and favorable tax regimes (function 5), and by doing so create legitimacy for a new technological trajectory” (p. 425). Their success is directly dependent on the resources available (function 6) and the social expectations (function 4) that are coupled with the new technology. This function can be analysed by mapping the rise and growth of interest groups and their lobby actions.

### c.4.1 Interactions between functions

As can be observed in the previous section, functions influence each other. They can have cascading effects as a fulfilment of one function, can lead to progression in others. They can also compliment each other: “Clear legitimacy (function 4: guidance of the search) has positive effects on knowledge creation. At the same time, a certain amount of knowledge creation is necessary to create expectations about the new technology, which may eventually lead to the building up of legitimacy” (p. 426). The authors expect a non-linear model with numerous interactions between the functions, that can either positively or negatively affect the overall performance of the system. One can expect the system to have many possible interactions, due to having seven total functions. However, through empirical studies, motors of change have been identified. They are a limited set of functions that engage other functions. They visualize this theory in Figure A6.

![Figure A6: Three typical motors of change (Taken from Hekkert et al., 2007)](image)

Motor (C) can be seen in the field of sustainable technologies. A typical cause for virtuous cycles in the field is F4: guidance of the search. The government sets environmental goals and puts in resources to limit environmental damage. The usage of these resources leads to knowledge development and increases expectations of technological options. A second virtuous cycle can be seen from entrepreneurs that lobby for a better climate for new technologies. They lobby either for increased resources for R&D, which can increase expectations (Motor B), or they can lobby for niche or protected markets to level the playing field for new vulnerable technology (Motor A). An improvement in entrepreneurial activities [F1] can be seen when new markets are created, leading to increased knowledge formation [F2], more experimentation [F1] and further lobbying [F7] to strengthen conditions and higher expectations that guide further research [F4] (p. 426).

However, vicious cycles can also emerge. When high expectations are put into the development of technology, publicity and promotion can often exceed viability. If
experiments lead to poor results, it can lead to a collective disappointment, resulting in fewer new projects, lack of available resources and therefore less knowledge development. This was the case with biomass gasification in the Netherlands.

C.5 GEELS' DYNAMIC MULTI-LEVEL PERSPECTIVE

Geels (2002) addresses the question of how Technological Transitions (TT) occur. TT is defined by Geels as "major technological transformations in the way societal functions such as transportation, communication, housing, feeding, are fulfilled" (p. 1257). Geels formulates a dynamic multi-level perspective to analyse TT. Similar to Hekkert et al., he looks at the technological transformations in a holistic way. TT not only implies technological changes, but also the socio-technical aspects of the system, such as laws and regulation, networks, infrastructure, user practices and symbolic meaning of technology. Both Hekkert et al. (2007) and Geels agree that niche or radically new technologies have difficulties emerging into the current system due to users, networks, infrastructure, laws and regulations being aligned to the currently used technology, creating a lock-in effect. Therefore, Geels explores if there are specific patterns and mechanisms in the TT. To do so, he adopts an approach that stems from the sociology of technology, meaning that technology is essentially useless and without a purpose unless "in association with human agency, social structure and organisations does technology fulfil functions" (p. 1257). All the elements that fulfil social functions are bound together through their elements, where artefacts, skills and technology and embedded in their socio-technical systems. To visualize this thinking, Geels used the example of personal transportation, presented in Figure A7.

![Figure A7: Elements from the sociotechnical configuration of personal transport (Taken from Geels, 2002)](image)

The figure depicts the numerous elements that are involved in a socio-technical configuration. They are linked and aligned together and the emergence and concurrent substitution of one technology to the other is far from being effortless due to the lock-in effect. However, the socio-technical configurations are rarely locked permanently and cascading effects can be triggered when elements are changed. However, the question remains, how can the lock be broken? This question entails a
high level analysis of the socio-technical system and the network of actors involved.

Geels uses the notion of "regimes" to describe the stability of different linkages between heterogeneous elements. "The elements and the linkages are the result of activities of social groups which (re)produce them." (p. 1259). These groups are aligned with one another and co-ordinated. Geels uses the example:

"Road infrastructures and car regulations, for instance, are built and maintained by transportation ministries. Cultural and symbolic meanings of cars are produced in the interaction between users, media and societal groups. User practices and mobility patterns emerge from the daily use of cars by user groups. Industry structures are the outcome of mutual positioning and strategies of car manufacturers and their suppliers. The technological knowledge embodied in cars is created by car designers and engineers, while cars as artefacts are produced by car manufacturing firms." (p. 1259).

This co-ordination between the groups forms the technological regime, which results in technological trajectories, due to the community of actors searching in the same direction. This concept is then expanded to introduce socio-technical regimes, which is coupled with the technological regime. It describes the semi-coherent ruleset carried by different social groups within the multi-actor network. The socio-technical regime includes the practices, knowledge, governance structures, product characteristics, morals and norms that can dictate the trajectory of technological change (p. 1260). This multi-actor network and their interactions is presented in Figure A8

![Figure A8: The multi-actor network in socio-technical regimes (Taken from Geels, 2002)](image)

Overarching the regime is the socio-technical landscapes. It is the material context and rigidity of societal constructs, such as material and spatial arrangement of a city, infrastructure, factories and highways. Contrary to the socio-technical regimes, which refer to the rules that inhibit or enable activities, the landscape refers to a set of heterogeneous elements that are external to the interactions of the actors in the system. These external factors include oil prices, environmental problems, wars, economic growth, cultural and normative values (p. 1260). Landscapes change, but much slower than regimes. The regimes create innovations in incremental steps while radical innovations are produces in niches. The niches are protected from the regular regime markets, which they need, as they normally emerge as crude and inefficient innovations, having low performance and high expenses. These protected markets can be formed through public endeavours, such as the US Army, which through their "incubation chambers" developed the radar, jet engines and the early internet. The niches allow for opportunities for learning processes, such
as learning by doing, interacting and using. The relationship between landscapes, regimes and niches is depicted as a nested hierarchy, seen in Figure A9.

![Diagram](image)

**Figure A9:** The multi-level nested hierarchy of landscapes, regimes and niches (Taken from Geels, 2002)

This conceptualization means that that the levels are embedded, niches within regimes and regimes within the landscape.

"The meso-level of ST-regimes accounts for stability of existing technological development and the occurrence of trajectories. The macro-level of landscape consists of slow changing external factors, providing gradients for the trajectories. The micro-level of niches accounts for the generation and development of radical innovations." (p. 1261).

The niches are vital for TT as they provide the "seed for change" (p. 1261). Innovative efforts are birthed in niches within the current regime, controlled by the specific rulesets, frameworks, knowledge and capabilities within that regime, along with the problems currently being faced. Successful developments of niches, being reinforced by changing developments in regimes or the landscape can allow them to develop. Changes in the landscape level, such as economic growth, can create additional resources for niches to emerge. Similar situations can occur within the regimes, such as environmental issues that create demand for new niches to emerge.

Geels presents his finalized dynamic multi-level hierarchical perspective on TT in Figure A10.

The socio-technical regime is broken up into seven dimensions: technology, user practices and application domains (markets), symbolic meaning of technology, infrastructure, industry structure, policy and techno-scientific knowledge. The arrows flowing from these dimensions represent the incremental ongoing processes (represented with long arrows). Each dimension has internal dynamics as well as acting externally on other dimensions, leading to tensions and conflicting opinions and uncertainty. This is represented with changing trajectories of the arrows and the smaller diverging arrows. The landscape level is depicted with large slow-moving arrows, which represent its dynamics. Changes and evolution occurs slowly, such as cultural changes, norms, large political changes and demographic trends (p. 1262). The niche level is more chaotic, as a dominant design has not yet been fully formed.
Figure A10: The dynamic multi-level perspective on Technological Transitions (Taken from Geels, 2002)

Variety is high and numerous different technological trajectories are available, depicted with the high divergence of arrows. Some fail, not being able to emerge through the meso-level. However, a right window of opportunity can be utilized. Radical innovations can gain traction and stabilize, leading to their breakthrough into the socio-technical regime, and affecting the landscape level. This causes turmoil within the socio-technical regime, where the arrows become more divergent when a radical innovation breaks through. The concept is that TT is about the linking of multiple technologies, elements and dimensions. It includes not only markets and user practices but also regulations, current infrastructure, norms and political ideas. Nevertheless, the question presented earlier: “How can the lock-in effect be broken” or put into context of the dynamic multi-level perspective: “How do the arrows from niche to regime come about?” (p. 1262).

Geels argues the emergence of innovations from the niche level to the socio-technical regime happens instantly or all at once, but rather through a series of gradual improvements, so called niche-cumulation. Using the example of steamboats, early experiments started with the canal-boom in the late 1700’s as steam tugs and mail steamers. Further landscape changes, such as the European political revolution, Irish potato famine and the Californian gold-rush, stimulated the oceanic passenger transport in the 1840’s (p. 1271). This created ideal conditions for new technology to emerge in the sector, with gradual improvements each time in the technology of steamships. This technological add-on and hybridisation (p. 1271), meant that new technology met particular demand or solved bottlenecks that the older one could not fulfil. They do not instantly compete but rather create somewhat of a symbiosis (p. 1271). With regards to steam engines, the first iteration was a hybrid of a ship with both sails and a steam engine. Then through series of advancements, the steam engine became powerful enough to operate alone. Through landscape and regime changes, interlinked and influencing each other, new opportunities became available through demand that needs to be satisfied. This window of opportunity allows the niches to emerge through evolution, be embedded and become a part of the current regime, or as Geels puts it: “TT thus appear as a process of shifting assemblies or a reweaving and reconfiguration of sociotechnical elements [...] These insights have been synthesised in
a multi-level perspective consisting of three levels: technological niches, socio-technical regimes, socio-technical landscape. This perspective combines two views on evolution. Evolution as ‘variation and selection’ is encompassed by conceptualising niches as the locus where radical variety is generated, and regimes as selection and retention mechanism.”

However, Geels also notes that the strengths of the dynamic multi-level perspective, capturing the complexities of real-world developments is also its weakness. It is still a rather complex approach that requires numerous data, usually of qualitative nature. Furthermore, it is hard to draw clear-cut boundaries of the socio-technical regimes due to being broad units of analysis (p. 1273).

C.6 WU’S ET AL. KEY CRITERIA

Wu et al. (2014) argue that competition has shifted towards being between supply chains, rather than organizations. Enabling supply chain performance is no easy task, as it has grown to become large and complex, being extremely dynamic and involving myriads of partners. Supply Chain Management (SCM) attempts to challenge these issues through its concept of helping firms manage its partners in an attempt to effectively build long-term partnerships. Wu et al. (2014: p.122) define SCM as: “an effective management on the three complementary flows, material, information, and finance, between a focal firm and its partners”. Due to SCM’s often containing a vast amount of partners, sometimes located all around the world, the mechanism of managing these flows is through online information. The largest issues with this mechanism is information sharing and collaborative effort (p. 122). With regards to information sharing, it can be inconsistent between the partners upstream and downstream, resulting in the need to forecast demands based on fragmented information. This results in partners maintaining a higher stock for their commodity to better respond to market fluctuations, which can lead to the well known “bullwhip effect” (p. 122). Collaborative efforts is a mutual decision-making process which aims at achieving joint goals, allowing partners to mutually gain increased clarity in understanding future demands, responding with a feasible plan in order to satisfy it and coordinate the relevant activities in a structured way.

Social Exchange Theory (SET) argues that behaviours towards exchanging with others are decided by the benefits of interaction subtracted with the cost of that interaction. (For the reader, please see chapter C.2, where a detailed outline of SET is undertaken). SET composes several fundamental principles of reinforcements,
such as psychological or economical. These principles include trust, commitment, reciprocity, justice, relative dependence and power (p. 123). Numerous studies have utilized SET to explore developments in supply chain relationships. Wu et al. develop a research model in an attempt to explain the effect of these principals on information sharing and collaboration, exploring if they could improve supply chain performance and in turn the firm performance. Based on a literature review, the authors choose the following four principals, that act as antecedents to information sharing and collaboration, based on the theoretical foundations of SET: trust, commitment, reciprocity and power. The authors employ a structural equation model, equipped with hypotheses in an attempt to explore the effects the principals have on information sharing and collaboration. The research model is depicted in Figure A11.

c.6.1 Review of research model

It should be noted that when employing structural equation models, they can only be as good as the theory behind them, often becoming slaves to “fitishism”. Kroehne et al. explains it as: “Model fit can be maximized by introducing theoretically meaningless paths and error covariances instead of finding the optimum in balance with the parsimony principle that the simplest of similar models is the better choice.” (2003: p.15). As the figure depicts, trust, commitment, reciprocity and power are assumed to effect information sharing and collaboration directly. Information sharing is also argued to effect collaboration, and not the other way around. This argument can be understandable, with collaboration being futile without any sharing of information. In turn, information sharing and collaboration both effect the firm performance. Industry type and firm size are used as control variables, as such organizational characteristics can have potential effects on achieving supply chain performance (p. 123). The other two control variables are finance and non-finance measures, relating to the financial improvements, such as return on investment and sales growth, and non-financial improvements, such as in customer service or product performance. The authors argue that according to multiple studies, these aspects can have an effect on firm performance, resulting in being control variables.

c.6.2 Model hypotheses and research approach

The authors propose the following eleven hypotheses in an attempt to explore and explain the direct effects the latent variables have on information sharing, collaboration and firm performance.

H1: Trust positively affects information sharing in the supply chain.
H2: Trust positively affects collaboration in the supply chain.
H3: Commitment positively affects information sharing in the supply chain.
H4: Commitment positively affects collaboration in the supply chain.
H5: Reciprocity positively affects information sharing in the supply chain.
H6: Reciprocity positively affects collaboration in the supply chain.
H7: Power positively affects information sharing in the supply chain.
H8: Power positively affects collaboration in the supply chain.
H9: Information sharing positively affects collaboration in the supply chain.
H10: Information sharing positively affects supply chain performance.

Data was collected through a questionnaire with firms qualified by the authors to require an emphasis on the investment of supply chain technologies and significant experience in SCM practice. They gathered a sample size of 177. Figure A12 depicts
The results of the path analysis.

Figure A12: Wu et al.'s Research model

The path coefficients were estimated and resulted in all hypotheses to be accepted, except H6, as it only resulted in a path coefficient of .10. The findings reveal that trust, commitment, reciprocity and power are important antecedents. Furthermore, an vital link is seen between information sharing and collaboration, far stronger than the link between information sharing and supply chain performance.
Table A1 presents how the questionnaire of the Cooperative Innovation Analysis Framework was formulated, using the theories from the literature in chapter 3.

<table>
<thead>
<tr>
<th>Building-block</th>
<th>Origin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alliance’s social relations criteria</td>
<td>Theory of SET extracted from Molm (1994) and formulated into questions, either directly or modified to be more exhaustive.</td>
</tr>
<tr>
<td>Level of trust, commitment and power</td>
<td>Coupled in the framework with Alliance’s social relations criteria. Directly extracted from Wu et al., (2014: p. 130).</td>
</tr>
<tr>
<td>Technological characteristics and Resources</td>
<td>Geels (2002), Feitelson and Salomon (2004) used to brainstorm and formulate questions.</td>
</tr>
<tr>
<td>User behaviour and public perception</td>
<td>Feitelson and Salomon (2004) and Hekkert et al. (2007) used to brainstorm and formulate questions.</td>
</tr>
<tr>
<td>Industry structure and interest</td>
<td>Geels (2002) terminology used. Hekkert et al. (2007) used to brainstorm and formulate questions.</td>
</tr>
<tr>
<td>Policy and decision making procedures</td>
<td>Geels (2002) and Hekkert et al. (2007) used to brainstorm and formulate questions.</td>
</tr>
</tbody>
</table>

Table A1: Overview of the origins of the questionnaires in the CIAF
COLOPHON

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