BRAIN TRAINS: Intermodal rail freight transport and hinterland connections

A SWOT analysis to assess the Belgian rail practice

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Abstract: *This paper focuses on transversal research of the role and influences of rail freight transport, as a part of intermodal transport in Belgium. A SWOT analysis of the current situation is conducted, starting from the actual weak usage of this mode of transport. Five different fields have been identified, impacting the economy and society. Each field indicates critical internal strengths and weaknesses for intermodal rail transportation in Belgium, and identifies possible future developments and setbacks. A Delphi-like approach is used, including a heterogeneous panel of experts, discussing and validating the SWOT results. To prioritize the characteristics, a survey on the different SWOT elements is performed, asking the experts to rate each statement on its influence and likelihood of happening, indicating the level of uncertainty.*

Keywords: intermodality, rail freight, value added, sustainability, regulation, governance

1. Introduction

In 2011, the European Commission has set some very ambitious goals within its White Paper, in order to reach a more efficient and sustainable balance between the different modes of transport. The main strategy of the Commission is to encourage rail and waterborne transport, and to lower the dominant position of road transport in Europe. By 2030, it is the ambition to decrease the share of road freight with distances over 300 km by 30%. This shift is foreseen to go up to 50% by 2050. In order to do so, the White Paper anticipates on the development of a European Single Transport Area, including optimal connections and fixed corridors, increasing the possibilities to efficiently shift from one mode to another (European Commission, 2011). Reviewing the existing literature and analyzing the available statistical data on the three major inland transportation modes, it is clear that road transport is the dominant mode in Belgium, holding an estimated market share of 70.6% in 2012, measured as a percentage of the total ton-kilometers (tkm). Inland waterways and rail reach a market share of respectively 17.1% and 12.3%[5] (Eurostat, 2014). In order to increase the use of more

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[5] This includes conventional cargo and block trains, where rail freight trains run directly between the port and companies with an on-site rail connection, without transhipment to another mode of transport. According to

sustainable modes of transport, such as the latter two, an improved interoperability between the modes of transport is required, lifting the attractiveness of intermodal transport in general (Gevaers et al., 2012).

This paper is focusing on the development and results of a SWOT analysis concerning the current state of intermodal rail freight transportation in Belgium. Special attention is given to the methodology used to make a selection of the most important elements, in terms of impact and likelihood of happening, in order to focus on these outputs. This analysis is part of a transversal research of the role and influences of rail transport intermodality in Belgium, projected in BRAIN-TRAINS[6]. A starting point is the current relatively weak usage of this mode of transport in Belgium and the European continent in general. The goal of this analysis is to create a threshold, from which it is possible to start the identification of the impact of a changed environment, leading to a change in the use of intermodal rail freight[7]. The strengths-weaknesses analysis, as well as the opportunities-threats analysis, are therefore concentrated around five main subjects:

- Optimal corridor and hub development.
- Macro-economic impact of intermodality.
- Sustainability impact of intermodality.
- Effective market regulation for a well-functioning intermodality.
- Governance and organization for a well-functioning intermodality.

These five areas are not selected randomly, as they are linked to the different actors involved in the network of intermodal rail freight transportation, creating synergies and added value. When the relations between rail freight actors with a transport contract are analyzed from the point of view of payment flows, each logistics chain will start with a transport order from the party responsible for the delivery of the cargo. They are the demanding party in the transport market. Depending on the volume, this order can be placed directly at a rail company, but can also be distributed towards an (integrated) logistics service provider, a shipping agent or an intermodal rail freight organizer. They will organize the flow of goods until the destination. In order to execute the first mile or last mile of the transport in the hinterland, contact with transport companies will be sought by these parties. The rail terminal operator is responsible for the operations on the transhipment terminal and can be contacted directly by the rail company, as well as by the different parties involved in the organization of the most optimal cargo stream to destination. In addition, the rail company is also linked to a number of suppliers. The infrastructure manager is in charge of the distribution of network capacity and the maintenance of the infrastructure. Rail companies have to pay a fee to the infrastructure manager for the use of the network. Banks and insurance companies deliver the necessary financial support for investment in rail equipment. This equipment is often produced by rail suppliers, who are the last important actor in the chain of rail freight transportation.

It should be clear that, although all actors are crosswise related to these fields, some show stronger relationships with one or more topics. For example, the railway infrastructure manager will have a direct interest in the optimal corridor and hub development. With the

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Grosso (2011), Intermodal transport can be defined as « the movement of goods in one and the same loading unit or vehicle, which uses successfully several modes of transport without handling of the goods themselves in transshipment between the modes ». In this respect, the share of intermodal rail transport is even lower.

[6] Belgian Research Action through Interdisciplinary Networks - TRansversal Assessment of new INtermodal Strategies - https://www.brain-trains.be

[7] In the next phase of the BRAIN-TRAINS project, the presented SWOT analysis will lead to a number of plausible scenarios, as a common interdisciplinary starting point for further analysis. These results will be integrated and analyzed, in order to create indicators for intermodal rail transport development in Belgium.

current selection of research areas, all interests of the different players are incorporated in the analysis of the current state. In addition, by developing the SWOT for intermodal rail freight from an interdisciplinary approach, both scientifical, sectorial as well as policy-related added value can be generated. Scientifically, as existing research is mainly focusing on one mode of transport, not taking into account the full chain perspective. Sectorial, as rail transport companies are still working in isolation, with no or little co-operation. For policy-makers, as the responsibilities for intermodal rail transportation in Belgium are split over different levels (regional, federal and European), ideally all supporting and working towards the same end result.

In section 2, an overview is given on the methodology used to establish the SWOT analysis. A variation of the Delphi method is combined with a qualitative literature study and a quantitative survey on the importance and likelihood of the different identified characteristics of intermodal rail transport. The results of this analysis are summarized in section 3. Some final conclusions are made in section 4.

2. Methodology

This section discusses the used methodology for the creation of the SWOT. An adaptation of the Delphi technique is combined with a statistical analysis of the survey results.

2.1. Adaptation of the Delphi technique

According to Hsu and Sandford (2007), the Delphi technique is often used to acquire consensus within a heterogeneous panel of experts. The Delphi process consists of a number of iterations, often started with a questionnaire, in which the panelists discuss and rate a number of items related to the subject. The goal is to make converge the different opinions. Within the current research, the panel exists of port authorities, rail freight companies, government representatives, academic contributors and private intermodal transport users. This variety in experts is crucial and renders the sample valid for further analysis. However, in this paper, the exercise starts with an extensive review of the existing literature, where both scientific publications, government studies and sector reports are taken into consideration. Kerlinger (1973) validates the use of such a modified Delphi process, as information on the concerned issue is already available and usable. Moreover, Hasson et al. (2000) describes a variation on the Delphi technique process, using important qualitative data retrieved from interviews. As such, a preliminarily list of possible internal and external characteristics of intermodal rail transportation is created during a first round of consultation. These first results are taken as an input for the second round, consisting of individual interviews with different specialists and authorities, being part of the panel. A third round consists of a traditional round-table discussion with the full panel of experts, discussing and validating the previous results. Ultimately, a final version of the survey contains all identified internal characteristics and possible external trends of intermodal rail freight. The survey obtains the quantification of the impact and likelihood of the different SWOT elements, as validated by the panel at the end of the previous round. In this way, the importance of each element, as well as the level of uncertainty, can be obtained. The output of the survey is a priority ranking, resulting in a selection of elements to focus on, which will help as an input to build plausible scenarios for further analysis.

2.2. Survey methodology

The survey methodology is a 3-step approach. First, a Likert scale needs to be decided. Secondly, frequency tables are calculated. This allows determining two common indicators for the analysis of ordinal data, namely the modus and the H-index, indicating the consistency

in the respondents' answers. Thirdly, a priority ranking is obtained by sorting the elements based on the results of these two indicators. Focus is put on the elements with the biggest impact or influence, and the highest likelihood of happening or lowest level of uncertainty. In total, 14 respondents have participated to the survey, of which three port authorities, two rail freight operators, two government representatives, three consultancy/academic contributors and four private intermodal transport users.

2.2.1. Likert scale

Each identified and approved SWOT element is to be rated by the experts of the panel on a Likert scale ranging from 1 to 5. For further analysis, the responses on this Likert scale have been simplified by clustering category 1 and 2 into a negative factor (-), category 3 into a neutral factor (o) and category 4 and 5 into a positive factor (+). This allows for a better interpretation of the results. Details of the survey scale and clustering are illustrated in Figure 1.

Figure 1: Used Likert scale for the BRAIN-TRAINS survey analysis

	1	2	3	4	5
Influence	No influence	Weak influence	Moderate influence	Strong influence	Very Strong influence
	-		o	+	
Likelihood	No likelihood	Weak likelihood	Moderate likelihood	High likelihood	Very High likelihood

Source: Own composition

2.2.2. Frequency tables, modus and H-index

As the data collected from the survey are Likert scale based (ordinal data), the most common statistical approach is the use of frequency tables, the modus and the H-index. The latter defines the homogeneity of the different answers, which indicates the level of agreement of the respondents. In this way, the results can be compared on their consistency. The same methodology was used by Acciaro et al. (2013) and Vanelslander and Sys (2014) to evaluate a set of actions to increase port competitiveness.

- **Frequency tables** indicate the percentage of answers for each score on a specific element. From these tables, the scores that have been selected most, can be identified. Equally, it does provide a first insight on the spread over the different scoring possibilities, indicating the level of agreement.
- **The modus** is the score with the highest frequency, i.e. most of the respondents provided this answer to the question. In case different scoring options receive the same amount of responses, an adjusted average modus is stated.
- **The H-index** is a relative homogeneity index and is calculated as the standardized value of the square sum of the percentage frequencies of the ranking. The **absolute** homogeneity index h_i is calculated for each SWOT element as follows (Acciaro et al., 2013)

$$h_i = \sum_j f_{ij}^2$$

F_{ij} is indicated as the percentage of respondents that ranked an element *i* with value *j*, with $j \in \{1,2,3\}$. On a 3-point Likert scale, the H-index can be interpreted as follows. When h_i equals 1, maximum homogeneity is reached, as all the elements are given the same score. When h_i equals 0.333, maximum heterogeneity is reached as all the elements

are given a different score. This is illustrated in Figure 2. In order to define the **relative** homogeneity index H_i, the following formula can be applied (Acciaro et al., 2013):

$$H_i = \frac{h_i - \min(h_{i)}}{\max(h_i) - \min(h_i)}$$

On a 3-point Likert scale, the relative H-index can be interpreted as follows. When H_i equals 100%, maximum homogeneity is reached, as all the elements are given the same score (respondent agreement). When H_i equals 0%, maximum heterogeneity is reached, as all the elements are given a different score (respondent disagreement). This is also illustrated in Figure 2.

Figure 2: Maximum absolute and relative homogeneity and heterogeneity examples

Respondent 1	3
Respondent 2	3
Respondent 3	3

Frequency		
1	2	3
0%	0%	100%

Maximum absolute homogeneity:

$\max(h_i) = 0\%^2 + 0\%^2 + 100\%^2 = 1$

Maximum relative homogeneity:

$H_i = (1 - 0{,}333) / (1 - 0{,}333) = 100\%$

Respondent 1	1
Respondent 2	2
Respondent 3	3

Frequency		
1	2	3
33,33%	33,33%	33,33%

Maximum absolute heterogeneity:

$\min(h_i) = 33{,}33\%^2 + 33{,}33\%^2 + 33{,}33\%^2 = 0{,}333$

Maximum relative heterogeneity:

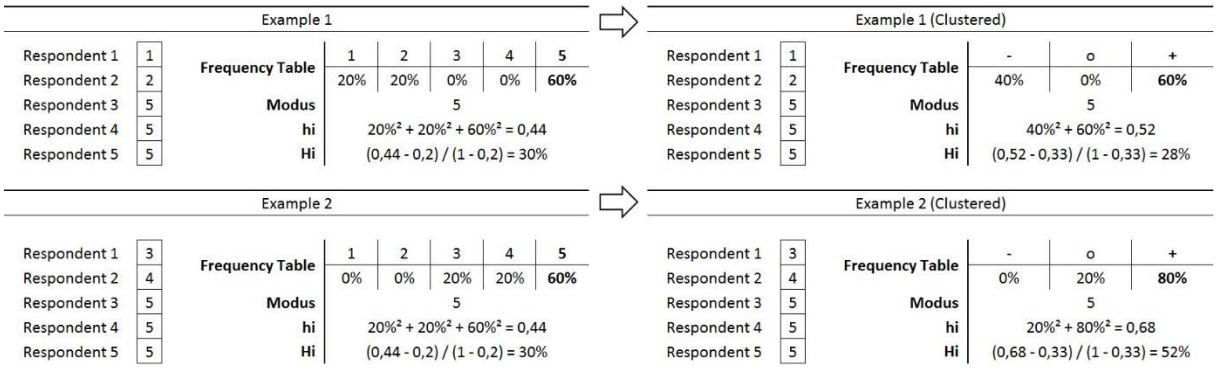
$H_i = (0{,}333 - 0{,}333) / (1 - 0{,}333) = 0\%$

Source: Own composition

2.2.3. Validation of a simplified Likert scale

The advantage of a 5-point Likert scale over a 3-point Likert scale, is that respondents receive less stimulation to select the neutral option. However, for analysis with the H-index, a degree variation in a selection of similar options might lead to false conclusions. This is illustrated in the examples in Figure 3. Using a 5-point Likert scale leads to the impression that both examples result in an equal H-index of 30%, and as such a similar agreement rate between the respondents. However, when the answers from similar selection possibilities are clustered into a 3-point Likert scale, as illustrated in Figure 1, the intuitive difference between both examples becomes clearer. As the answers in the second example are spread only over the neutral and positive selection options, the homogeneity rises to 52%.

Figure 3: Comparing examples with a 3-point and a 5-point Likert scale



Source: Own composition

In order to define the priority for each element, the modus and the H-index are calculated. The elements are then sorted according to the modus, positive to negative, and sub-ranked according to the calculated homogeneity. By doing so, a ranking is obtained, indicating the answers with the highest modus and level of agreement between respondents. Priority is given

to the elements with the biggest influence and the highest likelihood of happening. The results of this analysis are summarized in the next sections[8].

3. Results

The results in this section are a summary of the elements that have been identified and selected based on their indication with an important impact factor on intermodal rail freight developments and/or a considerable likelihood of happening in the future.

3.1. Strengths

In total, 14 strengths of intermodal rail transport are identified and approved by the heterogeneous panel. They are taken into account as input for the survey described in the methodology above. Analyzing the frequency table for the strengths, a very diverse pattern can be found. Both for the influence and for the likelihood of happening, strengths are very much distributed over the negative (impact: 5 / likelihood: 5), neutral (impact: 3 / likelihood: 7) and positive (impact: 6 / likelihood: 2) factors. Based on these survey results, the five most meaningful strengths are selected, to be discussed in detail below.

High payload capacity and reduced costs Due to the important capacity of trains and the concept of freight consolidation and flow bundling, intermodal rail transport is able to move large quantities of goods, with a higher payload of containers in comparison to trucks (Kreutzeberger et al., 2003). This strength is generating economies of scale, leading to reduced operations costs per unit transported (Rodrigue et al., 2006). This strength has been identified with a high impact on intermodal rail transport and a relative homogeneity of 34.18%, indicating a high level of agreement between the respondents. Regarding the likelihood of happening in the future, a high level of disagreement is observed, which can be derived from the relative homogeneity of only 4.14%. Indeed, although 46.15% of the respondents agree with the moderate likelihood of happening, 30.77% states a positive likelihood and 23.08% states a negative likelihood of happening.

Reduced externalities External costs arise from influences on the environment due to the development of infrastructure, accidents, congestion and the emission of noise and air pollutants. The studies of Grosso (2011) and Fries and Hellweg (2014) show that the marginal external cost of rail transport is considerably lower compared to that of road transport, making it a sustainable mode of transport. This is especially the case when an electrified railway is used and when rail transport is executed over long-haul distances (Spielmann and Scholz, 2005; Kreutzeberger et al., 2003). This strength is evaluated with a high impact and a high likelihood of happening, accompanied by a respective relative H-index of 43.2% and 9.69%.

Relation with GDP The correlation between the Gross Domestic Product (GDP) and logistics works in both ways. On the one side, an increase in logistic activities will impact the growth of GDP. Depending on the source consulted, the global logistics industry is contributing by 14% to the world's GDP. At European and Belgian level, the logistics sector is representing 5 to 8% of the corresponding GDP (Flanders Logistics, 2006; European Commission, 2006). On the other side, following the trend of increasing globalization, a change in GDP also affects the demand for mobility and as such the logistics industry performance. Although this strength has been identified with a moderate impact and

[8] The results of the part on governance and policy-making are based upon a case study of the development of rail freight intermodality in Belgium. This policy analysis draws on a detailed process-tracing, based on an analysis of parliamentary documents and a series of interviews with government officials. It is difficult to rank the outcomes of the policy analysis according to the methodology mentioned above. Therefore, the results of this case study are not presented in sections 3.1 to 3.4, but instead summarized in section 3.5.

likelihood of happening, it is still identified as a crucial point to take into account when developing scenarios for future developments on intermodal rail freight transport, mainly due to the importance of the relation between transport volumes and economic growth.

A better modal split Translating the goals of the White Paper (European Commission, 2011), the reduction of road transport over 300 km by 30% will lead to a decrease in the share of road transport, measured in tkm, from the current 75% to 52%. At European level, this will result in an increase of the rail share from 21% to 39%, and an increase of the inland navigation share from 4% to 8%, when the shifted volumes are spread equally over both modes of transport (Tavasszy and Van Meijeren, 2011). In Belgium, the modal share for inland waterways will be higher, due to the unique geographical position with the presence of several waterways (Crozet et al., 2014). In the output of the survey, this element has also been rated high impact and a corresponding relative H-index of 16.57%. This correlates with a rather high level of agreement, as 7 out of 14 respondents indicate a high impact, 5 out of 14 respondents indicate a moderate impact and only 2 respondents indicate a low impact.

Liberalization The goal of liberalization is to stimulate cross-border competition, as each European railway company with the needed licenses and safety certifications can apply for capacity on each national and international freight service desired. As seen with the liberalization of the road freight, this process could bring increased competition and as such render the industry more efficient and attractive, as service-levels tend to increase in the long-run (Paardenkoper, 2009). According to the figures of the European Commission (2014a), non-principal undertakings in Belgium obtained a considerable market share of 13.39% in 2012. Nevertheless, Belgium is still scoring average in terms of the Rail Liberalization Index (Crozet et al., 2014). According to the survey respondents, the market liberalization will have a high influence on rail transport development, indicated by a positive modus with a relative homogeneity of 34.18%. Nevertheless, it is not certain that liberalization will come to its full extent, as the survey indicates a high level of disagreement in terms of likelihood of happening with a relative H-index of only 3.57%.

3.2. Weaknesses

In terms of weaknesses, 17 elements are taken into account as input in the survey. Analyzing the frequency table for these weaknesses, a less diverse pattern is noted. No weaknesses have been identified as unlikely to happen, and only one element has an estimated low impact, being the fact that freight transportation is a new field of knowledge in the LCA methodology. By sorting the strengths on the modus, and next on the relative H-index, a ranking can be obtained. By doing so, attention is to be given to five weaknesses.

High operating costs According to Janic (2007), operating costs incorporate the costs of moving units between shippers and receivers through the stages of collection, distribution, line hauling and transhipment. Drayage operations, in particular, contribute by 25 to 40% to the total origin-to-destination expenses (Macharis and Bontekoning, 2004). This element is ranked with a high impact (positive modus) and a high level of agreement, indicated by a relative H-index of 36.10%. There is a low level of uncertainty for this element, as the likelihood of happening is high according to the respondents, with an H-index of 28.99%.

Complex pricing strategies Striking the balance between competitiveness and profitability through pricing decisions is a complex process, requesting an accurate cost estimation and a clear insight of the market situation. Bontekoning et al. (2004) identify two levels at which an intermodal pricing strategy operates: the individual actors (drayage and

main haul operators), and the whole door-to-door chain level. This element has a high impact and likelihood, with a corresponding homogeneity of respectively 28.99% and 16.57%.

Missing links Most gateways and corridor infrastructure currently in place could not handle a 50% increase, let alone a possible doubling or tripling of volumes of passengers and freight in 20 years from now. Hence, capacity is to be considered a weakness for intermodal rail transport development (OECD, 2012). This weakness is also indicated with a high influence and a high level of agreement, resulting in a relative H-index of 28.99%.

A lack of flexibility Rail freight transportation is highly dependent on rail equipment with a long life-cycle and the specific existing infrastructure with connection points to the network. As door-to-door delivery possibilities are therefore limited, the level of flexibility for this mode of transport is much lower compared to road transportation (Grosso, 2011; Vandressen et al., 2012). In addition, passenger traffic and freight transportation share the same network infrastructure, whilst the former usually receives priority of freight trains (Crozet et al., 2014). All respondents indicated this element as highly influencing the development of intermodal rail transport, resulting in a positive modus and an H-index of 100%. This point has also been stressed multiple times during the Delphi exercise and the interviews.

High investments and weak network access In order to enter the liberalized market of rail freight transportation, high capital expenditures are required to start up operations (Pham, 2013). In addition, network access is much weaker compared to that of road transportation, as this mode is less depending on network infrastructure and benefits from increased flexibility. The level of agreement between the respondents is high, both in terms of impact (H-index = 60.95%) and likelihood of happening (H-index = 43.20%).

3.3. Opportunities

Out of the 17 identified and approved opportunities, only one opportunity is unlikely to happen, being the GIS advantages in network design. None of the opportunities were found to be of low importance by the respondents. Based on these survey results, five elements are selected for additional focus.

Single European Transport Area The White Paper of the European Commission (2011) indicates that the creation of a unified market could reduce costs, increase the sustainability of transport in Europe, increase the number of quality jobs and set up a framework for safer transport. In addition, as Central and Eastern Europe's economies grow further and GDP per capita rates are increasing, the need for more than one European logistics center will arise. In order to connect the different corners of Europe, nine major Rail Freight Corridors on the European continent are under development. On the territory of Belgium, three of these corridors are connected to the Belgian rail network, all passing through the Port of Antwerp (Mitusch et al., 2014; INFRABEL, 2014). The respondents indicate this as an important element, with a high impact and a high likelihood of happening with a homogeneity of 26.53%, indicating a high level of agreement.

Standardization and interoperability According to Mitusch et al. (2014), the upgrade of the European fleet and rail network should be executed with the goal of increasing interoperability, and obtain standardization on the European continent. This will make intermodal transport more attractive and lower access barriers. Also harmonization of the different legislation acts and technical standards between EU member states hold opportunities to decrease the barriers to enter the market, to increase competitiveness for

intermodal transport and to increase network reliability (Crozet et al., 2014). A great benefit would be the ability to create multiple fall back corridors, serving as back-up solutions. Although there is a high level of agreement on the important influence this opportunity could have on the future development of intermodal rail transport (H-index of 46.75%), there is only little belief that this opportunity will take place, indicated by the neutral modus and moderate level of agreement in terms of likelihood of happening (H-index of 11.24%).

Promotion of intermodal transport at European level Depending on the willingness of Europe to promote intermodal rail transport, the results from the analysis of external costs of rail transport and monetization of impacts can be used to increase its attractiveness. The results obtained in this study could be used as criteria to help deciding on the development of intermodal transportation in Belgium including environmental aspects for the future and allowing the pollution reduction of direct emissions. This element has a positive modus on both impact and likelihood, with an H-index of 16.57% for both parameters.

Consolidation Container transport by rail need a certain distance in order to become attractive. The development of the European corridors described above will therefore strengthen the position of intermodal rail freight, supported by increased bundling possibilities due to an increased attractiveness of new or existing flows, once the delivery points become connected to the rail network (Crozet et al., 2014; Mitusch et al., 2014). These delivery points are built in the form of multimodal freight terminals, acting as regional hubs where flows are bundled and shifted from one transportation mode to another. Bundling leads to a better loading of the trains and thus to higher load factors. This means that the total transportation operational and external costs can be optimally split between the different units transported. The rail unit cost therefore decreases, which improves the attractiveness of rail transport, compared to door-to-door transport. As a counterpart of the opportunity represented by the consolidation of flows, the impossibility of consolidating freight is clearly a threat for intermodal rail transport. Indeed, if the bundling of goods is not possible, the high fixed costs and emissions have to be borne by the few units loaded on the train. The unit costs and emissions of intermodal transport thus increase, which makes it relatively less interesting in relation to road. All respondents have indicated that this element is of great importance, although the likelihood of happening is found to be only moderate, reflecting the respondents' caution on future cooperation activities.

Future road taxes There is currently a growing political consent to shift the costs of the infrastructure to the user. Imposing taxes on motorways is one example of such kind of policy. In Belgium, in 2016, trucks will be charged for each kilometer performed on motorways. These future road taxes, which penalize transport by truck (UPTR, 2015), can also indirectly benefit to intermodal rail transport, from the cost competitiveness perspective and at the condition that the road pre- and post-haulage are not too long. With an H-index of 28.99% and a positive modus, this element is found to be rather important and likely to happen.

3.4. Threats

In the last category, 17 identified threats have been analyzed in the survey. According to the experts, no threats are unlikely to happen, and only one element has a low impact ranking, being the lack of specific Belgian data on freight transportation. Two elements have been selected from the ranking, created by the survey results.

Cancellation of investments and subsidies Due to the current restricted budgetary context, resulting in severe savings in many European countries, a number of projects from the previous investment term have been or are at the risk of being frozen or delayed (MORA, 2012). Over the period 2007 - 2013, public investments have declined by 20%, indicating that the economic crisis might leave a long lasting impact on the investment climate (European Commission, 2014b). In Belgium, SNCB and Infrabel will both need to cut back on costs and expenses with 1.5 billion Euro, equalling also 20% of the budget, over the period 2015 - 2020 (Houtman, 2014). Subsidies for intermodal freight traffic in Belgium have been halved over the past seven years, from 30 million Euro in 2007 to only 15 million Euro in 2014 (Santos, 2015). This element has been identified as the most important threat in the survey analysis, with a positive modus and an H-index for impact of 49.49% and an H-index for likelihood of happening of 46.43%, indicating a high level of agreement between the different respondents.

Monopoly or duopoly Due to the liberalization and the creation of a Single European Transport Area, a number of well-established European players are eager to sweep the European market, by taking over the existing smaller companies. This trend is already going on in many European countries, who no longer have national railway companies operating in the rail freight sector, but left these activities to the main European operators (Crozet et al., 2014). Whether the development to a market of two or three rail companies would be a good or a bad evolution is not commonly agreed upon. This is also clear from the moderate level of agreement between the respondents in the survey. A high impact can be observed, with an H-index of only 11.24%. In terms of uncertainty, the panel is more consistent by stating a high likelihood of happening, with an H-index of 30.77%. The level of regulation and competition between the remaining players will prove essential if this trend continues, and a limited number of market players brings the advantage of an equal service being continuously provided. On the other hand, caution should be given to some niche markets, where the nature of the goods only allows rail transportation, risking intolerable price increases in the situation of a monopoly or duopoly (Crozet et al., 2014; Buyse et al., 2014). According to Crozet et al. (2014), the most likely scenario for Belgium will be a de facto duopoly with room for some small railway operators, although they would not be able to influence the decisions taken in the rail sector.

3.5. Governance and policy-making

The policy-analysis demonstrates that already in 1997, the idea of rail freight intermodality was high on the political agenda of the Belgian federal state. In order to make rail freight intermodality an integral part of the transport domain, it was, for two (interrelated) reasons, necessary to create unison among a wide nexus of actors. First of all, competences[9] in the transport domain are spread over a multitude of departments and agencies from both the federal and the regional level. Second, the field of transport is not an autonomous policy field. Actors from other policy domains[10] are also involved. These organizations either have an interest in transport policies or are necessary for the execution of agreed actions. Hence, only a transversal policy that exceeds the different policy fields and levels of government could turn rail freight intermodality into reality. However, establishing a transversal policy has been rather difficult (Stevens and Verhoest, 2014). There were several **structural determinants**, which refer to the impact of formal structures and procedures on coordination, which stifled policy integration. 'Quick wins' were requested as it was believed that a transversal strategy could root overnight. The strict policy cycle, which in turn was established, left little room for the stakeholders to negotiate terms and compromise on policy

[9] These competences are exclusive, equivalent material competences, which means that there is no hierarchy between a federal or regional legal norm.
[10] Economic affairs, spatial planning, environment, finance and justice.

solutions. Additionally, not all relevant actors were a part of the deliberation processes. Also **cultural determinants**, understood as the perceptual traits of actors, withheld a transversal strategy from emerging. Among actors, there were insurmountable differences with regard to the nature of the transversal policy and the necessity to create unison. A surreptitious discussion that simultaneously affected the governance of rail freight intermodality, was the call for delegating federal transport competences to the regional level. In consequence, some regional actors did not recognize the position of the federal departments and thereby blocked any attempt for collaboration. Lastly, **exogenous determinants** influenced the establishment of a transversal policy. In the first place, there is the growing interference of the EU in the transport domain. Although the EU has outlined an all-comprehensive transport vision, the concrete actions that over the years have been launched did not link the different transport modes. Domestic actors have not been encouraged to holistically look at the transport domain when transposing the EU legislation into domestic law.
In sum, rail freight intermodality has not yet attained a firm foothold in the Belgian transport domain. There has been mere negative coordination between federal and regional actors regarding rail freight intermodality. This means that every department or agency could see for itself how much effort would be invested in stimulating an intermodal rail freight transition, without being pressured by peer organizations or some shared objectives.

4. Conclusion

Intermodal transport and rail freight transport are faced with a weak usage in Belgium and by extension the European continent in general. In this paper, different internal strengths, weaknesses and external opportunities and threats are identified, impacting on intermodal rail freight development in Belgium. By consulting a heterogeneous panel of experts in the field of intermodal transport, both public and private, the impact and likelihood of happening of these elements have been defined, in order to make a selection of the most impacting elements. Intermodal rail transport in Belgium has substantial opportunities and as such possibilities to grow, due to the high payload and reduced costs, as rail transport is linked to reduced externalities compared to road transport. Due to the liberalization of the rail freight market, the European Union is ambitioning a better modal split and a boost for the economy due to the relationship between transport and the GDP. However, due to a number of weaknesses inherent to intermodal rail freight transport, such as high operating costs, complex pricing strategies, missing network links, a lack of flexibility, the need for high investments and weak access to the network, the anticipated effects of the market liberalization are not yet revealed. As competition is held back due to market entry barriers, the expected increase in efficiency has not come true yet. Intermodal rail freight also needs to take into account a number of external opportunities and threats, which might impact on its development. In order to stimulate the option of intermodal rail freight transportation, the Single European Transport Area needs to increase standardization and interoperability on the European continent. Together with the promotion of intermodal transport at European level, this needs to result in an improved consolidation of flows, in order to obtain the necessary volumes to make rail freight a valuable option. Also the future of road taxes might impact the use of intermodal rail freight in the future. Nevertheless, some factors might also negatively impact the development of rail freight. The threat of impossibility of consolidation and co-operation, the cancellation of investments and subsidies in the current restricted budgetary context and the possibility of a European monopoly or duopoly can seriously impact the evolution of intermodal rail freight transportation in the future.

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