

Embracing the potential of intermodal transport in Ethiopia: Strategies to facilitate export-led growth

Benjamin Nitsche * ¹

¹ Berlin University of Technology – Straße des 17. Juni 135 10623 Berlin, Germany

Purpose: Ethiopia has one of the fastest growing economies in the world, and by 2025 Ethiopia wants to become the manufacturing hub of Africa. To maintain growth, the Ethiopian government heavily supports industrial development in different core industry sectors. However, Ethiopia is still a developing, low-income country that has to overcome several barriers in order to attract foreign companies on its way to becoming a mid-income country. Therefore, efficient intermodal transport is seen as one of the key contributors to facilitating export-led growth. This study seeks to map the current state of intermodal transport in Ethiopia by synthesizing a holistic picture of current challenges and to propose strategies for dealing with them.

Research Design: A moderated Nominal Group Technique (NGT) group exercise was applied among 38 experts from local manufacturing industries, domestic and international logistics services, academia, and associations as well as governmental and non-governmental institutions.

Results: Through a structured group exercise process, the study condenses 19 challenges of intermodal transport in Ethiopia that are grouped into eight different clusters and assesses the importance of resolving those challenges in order to facilitate logistics performance. Moreover, strategies are proposed to improve the current state of intermodal transport and assessed according to their effectiveness and complexity. Consequently, recommendations and implications for four stakeholder groups are given: (1) governmental institutions, (2) non-governmental institutions, (3) foreign investors/manufacturers and local manufacturers as well as (4) local and international logistics service providers.

Theoretical Contribution: For research, the study provides a common basis for further discussions on the improvement of the current state of intermodal transport in Ethiopia. To support improvements, further research is necessary that acknowledges and integrates the country-specific characteristics of Ethiopia as well as its logistics conditions. By mapping the current landscape of challenges and potential strategies regarding intermodal transport, a synthesized basis for future research in this field is provided and concrete fields of action for research are outlined.

Managerial Contribution: For local managers already operating in Ethiopia, the study provides an overview of potential strategies that can be initiated in order to achieve more efficient domestic transportation. For managers seeking to enter the Ethiopian market, the study outlines the current state of domestic intermodal transport to provide more in-depth insights in order

*Speaker

to help them develop their market entry strategy with special regard to the domestic logistics conditions. For governmental decision makers the study stresses the importance of governmental and regulatory support in different areas in order to facilitate more efficient intermodal transportation.

Limitations: The study expands knowledge on intermodal transport in Ethiopia and provides a basis for further action from researchers and practices alike. Since the study is based on an NGT workshop with 38 professionals from different fields, further quantitative research will be necessary to draw more reliable conclusions. In particular the strategies that are developed to support more efficient intermodal transport in Ethiopia have to be understood as an initial starting point for further research and discussion with practice.

Keywords: intermodal transport; hinterland; logistics; Ethiopia; Nominal Group Technique

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1. INTRODUCTION

The development of intermodal freight transport systems can contribute to lower transportation costs and more sustainable logistics networks (Bontekoning and Priemus 2004; Bhattacharya et al. 2014; Mostert 2018) and has been discussed by an increasing number of researchers (Mathisen and Hanssen 2014). While for developed countries research often focuses on technology improvements and the contribution of intermodal transport to more sustainable transport solutions (Shin, Roh, and Hur 2018; Lin 2019; Kaack et al. 2018), developing countries, i.e. in SSA, first need to implement intermodal transport systems in order to participate in global trade (Pedersen 2001). This is the case because SSA countries are often prone to very high transportation costs that contribute to a large proportion of total landed cost when exporting goods from Africa (Devlin and Yee 2005). Therefore, transportation costs in SSA countries need to be lowered in order to facilitate export-led growth (Naudé, Matthee, and World Institute for Development Economics Research 2007). Acknowledging this circumstance, several SSA countries aim at facilitating more efficient intermodal transport, and some researchers contribute with studies focusing on South Africa (Schoeman 2014; Havenga, Simpson, and De Bod 2014) but also on low-income countries in East (Kalgora 2019; Okyere et al. 2019) and West Africa (Dettmer 2017; Amentae and Gebresenbet 2015).

Among low-income countries in SSA, Ethiopia has the most promise of becoming a mid-income country in the near future since it has one of the highest average annual GDP growth rates in SSA (around 10%) over the past decade (Coutts and Laskaridis 2019). This economic development is heavily supported by the government, which set itself the goal of becoming the manufacturing hub of Africa by 2025 and defined several projects and strategies to promote intermodal transport and other logistics-related initiatives (Ethiopian Maritime Affairs Authority 2019). Nevertheless, regarding the development of efficient logistics systems, including intermodal transport, Ethiopia is still in its early stages of development, and studies on intermodal transport in Ethiopia are sparse (Amentae and Gebresenbet 2015). Without a lowering of the cost of transportation in Ethiopia, economic growth will be dampened, and foreign companies will hesitate to invest.

To contribute to a better understanding of the current state and development potentials of intermodal transport in Ethiopia, this study aims at the following research objectives (RO):

RO1: Outline the current challenges of intermodal transport in Ethiopia that dampen export-led growth

RO2: Propose and assess strategies to improve the current state of intermodal transport in Ethiopia

The intent of this study is to condense multiple views on this topic through a multi-stakeholder approach. Therefore, a NGT group exercise (Delbecq and Van de Ven 1971) was conducted among 38 logistics and supply chain management (LSCM) professionals coming from local manufacturing industries, international and domestic logistics services, and academia, as well as governmental and non-governmental institutions. The participants met on-site and were guided by neutral moderators through a rigorous research process. Subsequently, the challenges described and strategies developed were assessed through a post-group-exercise questionnaire.

The remainder of the article is structured as follows: The next section outlines the current state of industrial developments and intermodal transport in Ethiopia. Afterwards, the research design is described in detail. Subsequently, the current challenges of intermodal transport as well as potential mitigation strategies are discussed from the NGT group exercise and questionnaire among participants. Then implications for research and practice as well as research limitations are discussed.

2. OVERVIEW OF INDUSTRIAL DEVELOPMENT AND THE CURRENT STATE OF INTERMODAL TRANSPORT IN ETHIOPIA

Ethiopia's economy is heavily dependent on agricultural products (for example coffee, cut flowers, oilseed crops, grain), which make up two-thirds of all exports, with coffee constituting about half of these. The remaining third mainly originates from gold, textiles, animal hides, cotton, plastics, and others (International Trade Center 2019; The World Bank 2018). To reduce dependency on low-value agricultural products, the Ethiopian government has strengthened economic development by supporting the construction of several industrial parks over the last years, often near major cities. Building on the Chinese model for industrial development, these industrial parks are mostly government-owned, are dedicated to certain industrial sectors where labor-intense processing steps are required – i.e. textile and apparel, leather and leather products, pharmaceuticals and agro-processing (Ethiopian Investment Commission 2020) – and provide foreign manufacturers with everything they need in order to locate production

within these parks (Giannecchini and Taylor 2018; Françoise 2017; Schmidt et al. 2018). Currently, over ten industrial parks have been built, and more than ten additional parks are in planning (Zhang et al. 2018).

Since Ethiopia is a land-locked country, exports are dependent on foreign sea ports, mainly the Port of Djibouti, which handles about 95% of the exports of Ethiopia (United Nations 2018). To strengthen the connection between industrial parks and the Port of Djibouti, reduce domestic transportation times and thereby facilitate export-led growth, the Ethiopian government seeks to invest more in infrastructure that enables an intermodal transport system (Ethiopian Maritime Affairs Authority 2019). Therefore, several dry ports are planned or under construction near industrial parks to consolidate goods for export. Modjo Dry Port is already operating and the most important one (Ethiopian Maritime Affairs Authority 2019). One dry port is already operating near the capital, Addis Ababa, but many others are in planning. These dry ports are about to be connected to a railway network that will connect major industrial zones with the Port of Djibouti, with each other, and with Ethiopia's neighboring countries. However, it should be noted that the majority of those railway tracks are already in the planning stage. The main line between Addis Ababa and Djibouti is already operating, and a new track connecting Mekelle with this main line was recently finished.

Although important infrastructure projects that will further facilitate intermodal transport have not yet been finished, the Ethiopian government has a clear vision on how to support export-led growth through intermodal transport. However, improving logistics performance in Ethiopia also means to integrate goals and mindsets of different stakeholders of the transportation process. In general, the main stakeholders in this process can be broken down into four groups: (1) *governmental institutions* (incl. regulatory bodies), (2) *non-governmental institutions*, (3) *foreign investors/manufacturers and local manufacturers* as well as (4) *local and international logistics service providers* (e.g. freight forwarders, transport operators, dry port operators, the Port of Djibouti).

Figure 1 provides an overview of Ethiopia's main exports and industrial parks and their connection to the intended railway networks. Analyzing this map makes it obvious that intermodal transport including the Ethiopian railway is targeted and will become more and more relevant in the near future. But logistics performance of domestic transport in Ethiopia, including intermodal transport, is low, leading to unsatisfied customers, long transportation

times, and high cost (Amentae and Gebresenbet 2015). Therefore, a more in-depth analysis of the current state and the challenges that dampen logistics performance is necessary, as well as strategies to improve the efficiency of intermodal transport.

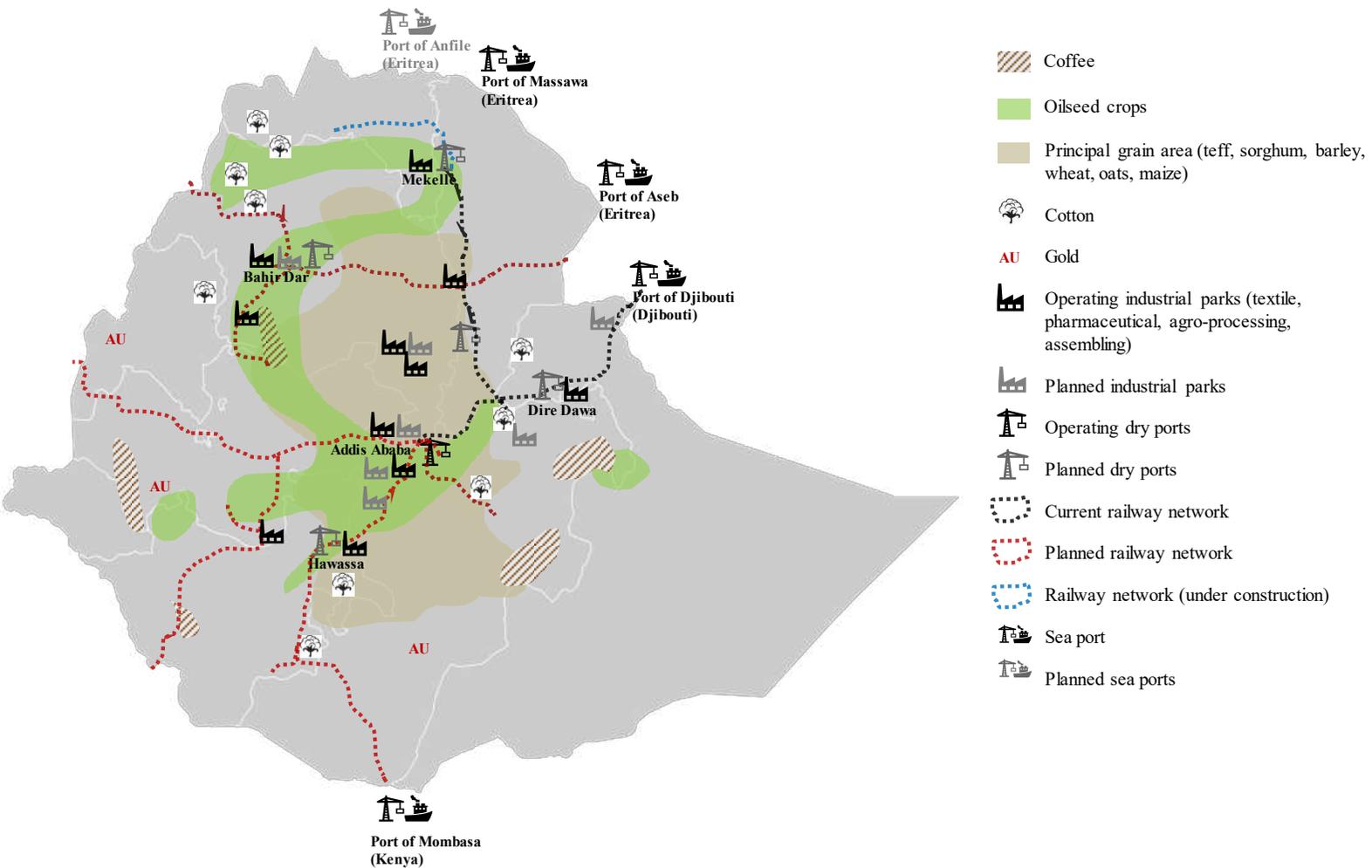


Figure 1—Overview of main export goods, industrial parks, and intermodal transport network of Ethiopia

3. RESEARCH DESIGN

To contribute to the above-mentioned ROs, an NGT group exercise was performed among 38 LSCM professionals from Ethiopian manufacturing industries, global and domestic logistics services, and academia, as well as governmental and non-governmental institutions. Through a rigorous and moderated group-exercise process, building on the Nominal Group Technique (NGT) that allows structured exchange of thoughts among experts while everyone is enabled to equally contribute to the discussion, current challenges of intermodal transport in Ethiopia that dampen logistics performance were depicted, and strategies to mitigate those challenges were proposed. Subsequently, professionals were asked to assess the importance of the challenges as well as the effectiveness and complexity of the strategies proposed in a post-group exercise questionnaire. The detailed research procedure is outlined in Figure 2. For group compilation (total sample as well as for sub-groups during NGT), the intent was to bring professionals with different expertise and views on this vital topic together and thereby integrate multiple stakeholders. Therefore, participants were invited to meet on-site for a group exercise in Addis Ababa, Ethiopia in November 2019 to discuss the topic of intermodal transport in Ethiopia. The demographics of the professionals participating in this group exercise are displayed in Table 1. The average work experience in LSCM of the people participating was 13 years (median 11.5 years).

Table 1—Sample demographics for the group exercise

Company type		Revenue (USD)		Total number of employees	
Manufacturing	5	Up to 10m	12	Up to 50	10
Logistics service provider (international)	9	10–50m	6	51–250	11
Logistics service provider (regional)	8	50–250m	3	251–1,000	6
Academia	8	250–1000m	2	1,001–2,500	4
Governmental organization	2	1–5bn	1	2,501–5,000	3
Non-governmental organization	3	Above 10bn	4	5,001–10,000	2
Association	3	n/a	10	Above 10,000	2

The NGT was chosen as the primary research method since it provides a rigorous process and has been proved to be efficient in the LSCM domain in extracting experts' knowledge on a certain topic (Schoenherr et al. 2012; Nitsche 2018; Nitsche and Durach 2018). The NGT clearly separates *problem description* from *problem solution* into two stages (Van de Ven and Delbecq 1971; Delbecq and Van de Ven 1971) and seeks to overcome the shortcomings of Delphi and focus-group techniques (Goodman 1987; Van de Ven and Delbecq 1971). Traditional Delphi groups, on the one hand, do not allow on-site meetings and interaction among group members which hinders the exchange of ideas and thoughts among peers (Goodman 1987). Focus groups, on the other hand, can induce bias in case of very dominant group members that tend to lead discussions if those dominant group members take most of the assigned time to express their thoughts while shy group members may have equally important contributions to make, but do not because of the dominance of others (Van de Ven and Delbecq 1971). In contrast, the NGT seeks to provide a structured process for groups to meet on-site and discuss vital topics but enable everyone in this discussion to contribute equally (Lloyd 2011; Green 1975).

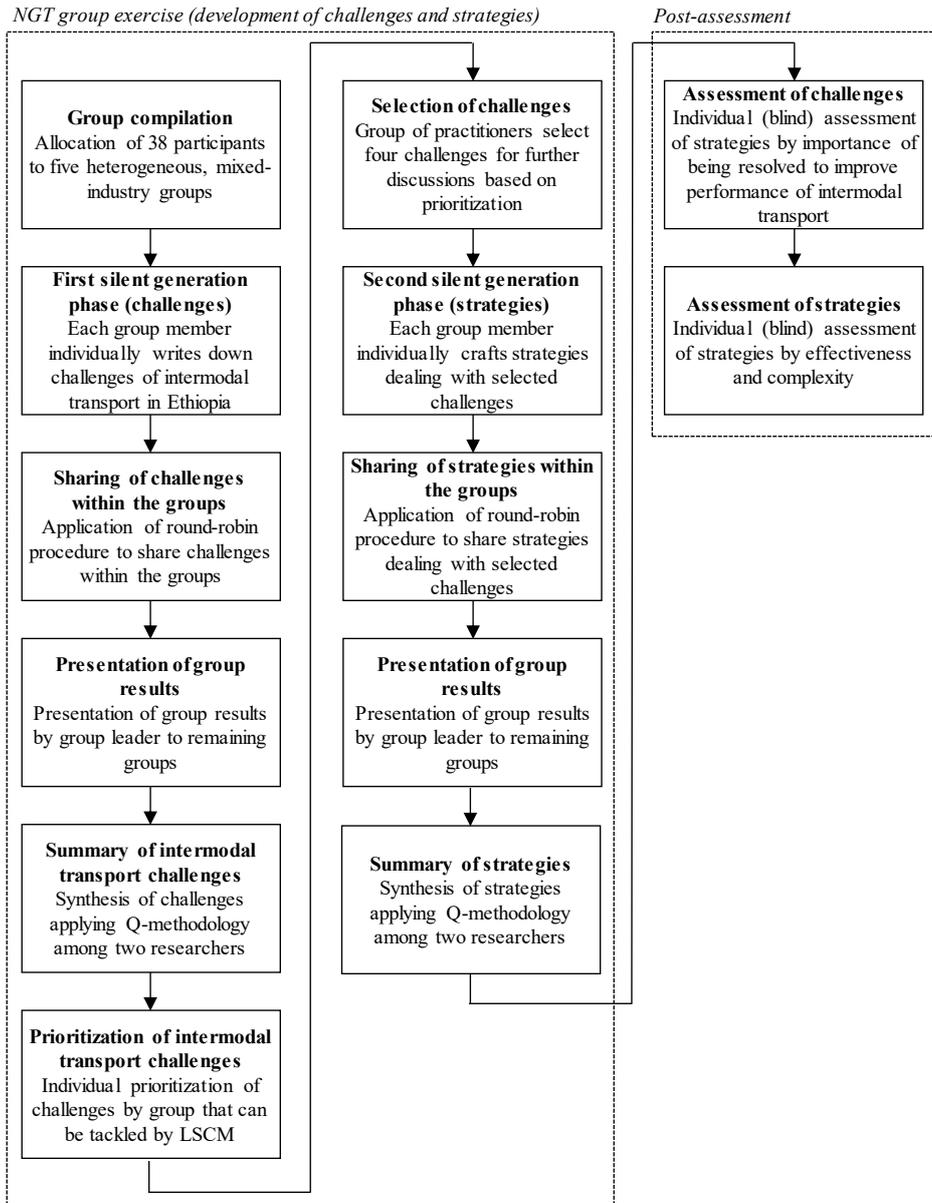


Figure 2—Research procedure

In preparation for the NGT, the group was separated into five sub-groups of seven to eight people (Chapple and Murphy 1996). It was intended to assign actors from different fields (industry, logistics services, academia, governmental and non-governmental institutions) to every group to enable mixed-industry discussions. Every sub-group performed the same procedure throughout the two-stage NGT process and was moderated by one neutral moderator that ensured that NGT guidelines were met (Delbecq and Van de Ven 1971).

During the first stage, *problem description*, each group member individually thought of current challenges of intermodal transport in Ethiopia during a *silent generation phase* and wrote their challenge down on single cards. Afterwards, to share the challenges within the sub-groups, a

round-robin procedure was applied which allows every group member to express one idea, one after another. This means that one group member read out loud one of his or her cards and explained the challenge and its impact on intermodal transport in Ethiopia. Questions of clarification could be asked, but discussions were interrupted by the moderator, to avoid the potential suppression of less dominant group members, this means to avoid the shortcomings of a traditional focus group which is one of the major reasons of performing the NGT. Subsequently, the next challenge was read and explained by the next group member. Following this procedure, all ideas of the *silent generation phase* were collected within the sub-group. Afterwards, each sub-group presented its results to the assembly. Based on the input of all sub-groups, Q-methodology (Ellingsen, Størksen, and Stephens 2010) was performed by two researchers to synthesize the challenges as proposed by Nitsche and Durach (2018). This methodology provides a structured bottom-up approach that assists the synthesis of a broad set of variables (here challenges) to higher-level/meta-level groups. To apply this approach, each researcher was provided with a set of challenges written down on single cards (one card per challenge) and read each card one after another. The research then either opened up a new group of cards or placed the card in an existing group of already assigned cards if thematic overlap was observed by the researcher. On the basis of this procedure, each researcher proposed a Q-sort and explanation of the synthesized groups of challenges. Similarities between both Q-sorts were identified and differences were discussed, leading to an overall synthesis of the challenges of intermodal transport in Ethiopia.

In preparation for the second stage, *problem solution*, the synthesized challenges of the first stage were presented to the assembly, and each group member had to individually vote for four challenges that he or she would like to develop strategies for and where LSCM could contribute to the mitigation of this challenge. The quantity of four challenges was chosen since this number of challenges was deemed as appropriate for discussions according to the time restrictions of this group exercise. Moreover, this procedure was chosen because it is possible that overcoming some challenges is of very high importance for mitigating their negative effect on exports, but overcoming them is hard for LSCM to do and is more related to governmental or other regulations. Therefore, the participants were asked to choose four challenges for which they would like to develop strategies based on their LSCM experience. After individual votes were compiled, four challenges were chosen for further discussion during the NGT group exercise. However, the strategies developed during the second stage were not necessarily only

applicable to some particular challenge but could have positive effects on solving other challenges as well.

For the *problem solution* stage, the same procedure as for the first stage was applied within four sub-groups. Each member of a sub-group had to individually think of strategies for solving each of the four challenges during a *silent generation phase*. Afterwards, a round-robin procedure was applied within the sub-groups to share the strategies developed. Following this procedure, the results of each sub-group were presented to the assembly.

After the NGT group exercise, participants were asked to perform an individual online-questionnaire-based post-assessment of the challenges and strategies developed. Each participant was asked to (1) assess the importance of the resolution of each challenge for facilitating efficient intermodal transport in Ethiopia (7-point Likert scale, 1=low to 7=high); and (2) assess the strategies developed by their *effectiveness* and their *complexity* (7-point Likert scale, 1=low to 7=high). *Effectiveness* was defined as the impact a strategy would have on the resolution of a challenge without considering the resources necessary to implement the strategy. *Complexity* was defined as the amount of resources needed in order to implement the strategy.

4. RESULTS

Based on a moderated multi-stakeholder NGT group exercise among 38 LSCM professionals—coming from manufacturing industries, regional and international logistics services, academia, associations, and governmental as well as non-governmental institutions—current challenges of intermodal transport that dampen export-led growth in Ethiopia were synthesized and assessed. Moreover, strategies to improve the current state of intermodal transport were condensed on the basis of professionals' experience.

4.1. Current challenges of intermodal transport in Ethiopia

Through the NGT process among 38 professionals followed by a Q-methodology workshop between two researchers, 19 challenges were synthesized and clustered into eight groups that contribute to three dimensions of challenges.

	Transport	Environment	Human Factor
	<p>Communicational challenges</p> <ul style="list-style-type: none"> • Missing cooperation between all stakeholders • Non-usage of information systems & integration • Missing transparency on locations, capacities & prices 	<p>Rail-related challenges</p> <ul style="list-style-type: none"> • No efficient connection of railway to customers / warehouses etc. 	<p>Road-related challenges</p> <ul style="list-style-type: none"> • Transport cost (road transportation) • Road availability & conditions • Long and volatile transport times (road) • Truck shortage
		<p>Regulatory challenges</p> <ul style="list-style-type: none"> • Customs / long clearing times • Monopolistic structures for intermodal transport • Volatile regulations not aligned with practice 	<p>Financial challenges</p> <ul style="list-style-type: none"> • No foreign currency access leads to delays
			<p>Human-related challenges</p> <ul style="list-style-type: none"> • Inadequate work ethics of worker • Lack of qualified personnel • Business ethics / corruption
			<p>Ship-related challenges</p> <ul style="list-style-type: none"> • Long and volatile transport times from Djibouti to Europe • Low vessel frequency • No usage of inland waterways
			<p>Transshipment-related challenges</p> <ul style="list-style-type: none"> • Missing processes to integrate transport modes

Figure 3—Overview of current challenges of intermodal transport in Ethiopia

Figure 3 provides a condensed overview of the challenges. Within the *transport dimension* all challenges are included that are connected to the physical transport of goods as well as the corresponding information flows. More precisely, *communicational*, *rail-related*, *road-related*, *ship-related*, and *transshipment-related challenges* are condensed. The *environmental dimension* includes challenges that are induced exogenously to the supply chain and can only be influenced indirectly by the stakeholders involved. In total, four challenges have been synthesized within this dimension, which are *regulatory* as well as *financial challenges*. The *human factor dimension* includes challenges that are related to the people involved in the process of intermodal transport. Figure 4 additionally outlines the post-assessment of the identified challenges by their importance of being resolved in order to facilitate more efficient intermodal transport.

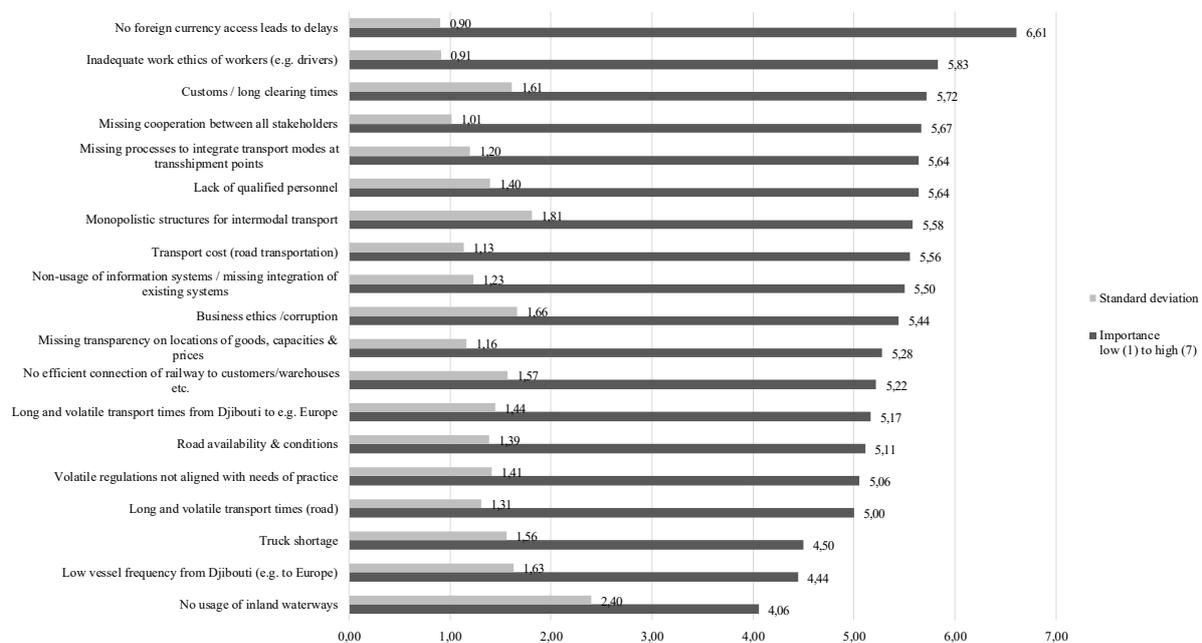


Figure 4—Assessment of challenges of intermodal transport in Ethiopia

Communicational challenges: This cluster includes challenges that relate to the communication and information exchange between the stakeholders involved in the process of intermodal transport. Professionals from the group exercise stated that *missing cooperation between all stakeholders* dampens the efficiency of the whole system. All the actors involved—for example port operators, freight forwarders, rail operators, and ocean carriers—are optimizing their own interests instead of working more closely together to provide more satisfying service for the customer. According to practitioners’ understanding, silo-thinking has to be overcome in order to facilitate intermodal transport since too many stakeholders are involved. This is supported

by the post-assessment, since this challenge is among those whose resolution is the most important and also involves relatively low standard deviation between the answers, which indicates a comparatively high level of agreement among participants. Additionally, the level of digitalization of the stakeholders involved is relatively low, leading to either non-usage of information systems or a low level of their integration. According to professionals, *missing transparency on locations, capacities, and prices* further dampens exports since transports cannot be planned efficiently in advance because no one knows when and where transport capacities will be available and at what price.

Rail-related challenges: Although it has been stated by practitioners that they acknowledge the support the government is providing to facilitate more rail transport, it has been stated by multiple participants that there is *no efficient connection of the railway to customers, warehouses etc.* This means that there are rail tracks available, but they are not well located near important industrial zones, which leads to more road transportation between these zones and dry ports or train terminals.

Road-related challenges: According to the expert panel, domestic transport for export from Ethiopia currently relies heavily on road transportation, which includes many challenges that need to be tackled. The most important challenge among them is *transportation cost* for road transportation. Participants stated that transporting a container via road from Addis Ababa to the Port of Djibouti (around 900km), which is the main connection for exports, costs between 3,000 and 4,000 USD (excluding insurance), which is at least four times as high as requesting a similar distance in Europe, which has an impact on every business case. Additionally, *road availability and conditions* are an issue because even between important nodes like Addis Ababa and the Port of Djibouti, roads are partially unpaved or sometimes very narrow and thereby only accessible to a single lane of traffic, leading to multiple accidents just because of the road conditions drivers are facing. This also affects transport times, which are, according to the professionals' opinion, too long and volatile to attract foreign investors.

Ship-related-challenges: Since Ethiopia is a land-locked country, it is dependent for exporting goods on seaports from neighboring countries, mainly the Port of Djibouti. However, the current circumstances at the Port of Djibouti dampen the export efficiency of Ethiopia. According to practitioners' insights, *long and volatile transport times from Djibouti to Europe* together with a relatively *low vessel frequency* of departures from Djibouti discourages foreign

investors from setting up manufacturing sites in Ethiopia. Transporting a container from Djibouti to a major sea port in Northern Europe takes from about 30 to 36 days, which is a long time compared to similar or even shorter transportation times from major Chinese sea ports to Europe. For Djibouti this is mainly because ships departing from Djibouti serve as feeders for even bigger vessels departing, for example, from ports of Yemen, leading to long waiting periods. Besides that, some participants stated that there is currently *no usage of inland waterways*, but according to the post-assessment, this was rated as the least important challenge but with comparatively high standard deviation of answers, indicating contrasting opinions on this challenge.

Transshipment-related challenges: Although Ethiopia has a lot means in place to facilitate more efficient intermodal transport, also utilizing the railway, participants in the group exercise expressed that *missing processes to integrate transport modes* hinder current developments toward more efficient transport. According to their understanding, if Ethiopia wants to develop intermodal transport, important network nodes and stakeholders such as dry ports, railway operators, port authorities, and freight forwarders must work hand in hand and integrate their planning processes, especially to ensure timely transshipment at the change of transport mode. But processes are not currently connected and aligned, leading, for example, to the departure of trains before additional loads arrive.

Regulatory challenges: Among regulatory challenges, *long customs clearing times* have been assessed as the most important challenge that needs to be tackled in order to facilitate more efficient intermodal transport. As stated by participants, customs clearance times contribute heavily to overall transportation times when exporting goods from Ethiopia. According to their experience, it takes between two and ten days to clear goods for export in Addis Ababa before transporting them to Djibouti. When arriving at the Djibouti border, goods have to be cleared again, which takes an additional two to three days before permission is granted to export those goods from Djibouti. Additionally, *monopolistic structures for intermodal transport* have been raised as an important challenge. Currently, the rail track is operated by the Ethiopian Shipping Line (ESL). If freight forwarders want to utilize the rail for faster transportation, they have to choose ESL as the railway operator. According to a lot of participants, the suppression of competition leads to many inefficiencies, especially for intermodal transport in Ethiopia, and ESL uses its strong position in the market and the scarcity of capacities to achieve higher prices.

However, it should be noted that opinions on that particular challenge were very diverse, as indicated by the high standard deviation from the post-assessment.

Financial challenges: According to the post-assessment, the most important challenge of intermodal transport in Ethiopia is that *lack of access to foreign currency leads to delays* when exporting goods. Ethiopia itself is opposed to an increasing trade deficit due to high-value imports and low-value exports (Rekiso 2020). As a consequence, Ethiopia lacks reserves in foreign exchange, for example US dollars, and restricts access to it. This being said, it often happens that international freight forwarders, port operators, and others have to be paid, but the restricted access to US dollars delays this payment and therefore the total transportation times of goods.

Human-related challenges: *Inadequate work ethics of workers* has been assessed as the second most important challenge. More precisely, participants expressed the issue that typical Western work ethics such as being on time and compliant to schedules and processes does not apply in the case of Ethiopia. Workers, for example drivers, are not used to these kinds of work ethics, leading to unplannable delays of deliveries. Additionally, professionals stressed the *lack of qualified personnel* in the field of LSCM that they are facing on a regular basis. Finding qualified personnel with adequate work ethics is one of the major challenges of companies when seeking to expand their business. Moreover, it has been explained that even today, an unequal understanding of *business ethics / corruption* dampens efficiency improvements in intermodal transport since transports are intentionally delayed to gain more profit from them.

4.2. Strategies to improve the current state of intermodal transport in Ethiopia

Based on the second NGT phase, strategies dealing with four pressing challenges of intermodal transport were derived and later on assessed according to their effectiveness and complexity. More precisely, the four challenges—*missing cooperation between all stakeholders, missing processes to integrate transport modes at transshipment points, lack of qualified personnel, and monopolistic structures for intermodal transport*—were discussed in order to develop strategies for dealing with them. First of all, it should be noted that although these were not the most important challenges from the post-assessment, they were among the more important ones. However, during the group exercise, participants were asked to choose challenges that they would like to develop strategies for dealing with on the basis of their LSCM experience.

Therefore, it can be assumed that, for example, the most important challenge of foreign currency access hardly can be tackled by means of LSCM.

Table 2—Overview of strategies developed for improving the current state of intermodal transport in Ethiopia

Challenge	Strategy	Effectiveness	Complexity
Missing cooperation between all stakeholders	Establishment of strong supply chain partnerships that share and align capacities	5.39	4.22
	Development of clear standard operating procedure for the different stakeholders in the supply chain	5.06	3.67
	Joint development of multi-stakeholder IT platforms	5.00	4.78
	Establishment of public and private multi-stakeholder cooperation platforms	4.94	3.89
	Clear definition of roles and responsibilities of platform members and KPI monitoring	4.67	3.72
	Development of incentive system to foster stakeholder cooperation	4.67	4.17
missing processes to integrate transport modes at transshipment points	Policy changes to accelerate customs at the port of Djibouti	5.65	5.41
	Establishment of a more frequent train connection between Djibouti and Ethiopia to make the train a more attractive transport mode	5.53	3.71
	Tracking & tracing of goods (on truck or container level) to better estimate arrivals at transshipment points	5.35	3.88
	Simplification of processes within each stakeholder to make mode changes more efficient	5.35	4.18
	Connection of IT systems of logistics service providers to utilize available data	5.12	4.24
	End-to-end visibility of actual and planned goods within the network to enable a holistic integrated planning	4.94	4.35
	Establishment of a central continuous improvement organization to control the whole flow of goods	4.82	4.29
Lack of qualified personnel	National certification for certain job profiles to assist companies in finding qualified personnel	5.25	3.25
	Incentivization of staff to participate in further education programs	5.22	3.28
	Development and implementation of KPIs to measure performance of personnel	5.17	3.39
	Knowledge capacity building through on-job mentoring and experience sharing (from another countries and experts)	5.11	3.44
	Vocational training on specific job profiles (considering good practice examples of other countries)	5.00	3.28
	Collaboration between companies and universities to teach the necessary practice-oriented content to close gap between theory and practice	4.94	3.44
Monopolistic structures for intermodal transport	Set-up and follow-up on KPI (that track operators' performance) to lower prices	5.33	4.39
	Support of consolidation of small operators	5.00	4.44
	Anti-monopoly regulations to open up the market for freight forwarders	4.78	4.28
	Promotion of platform for transparency of small operators and their services and prices	4.36	4.17
	Promotion of sub-contracting schemes	4.33	3.94
	Conduction of quantitative study that assesses whether monopolistic structures in Ethiopia lower logistics service level and increase cost	4.28	4.33

* the values shown for complexity and effectiveness represent the mean value of all answers

Table 2 outlines the strategies developed as well as their assessment according to effectiveness and complexity. Although the strategies were developed for dealing with a certain challenge that was derived from the first part of the NGT group exercise, it can be observed that similar approaches were developed for dealing with more than one challenge. Moreover, closer examination of the strategies reveals that the strategies developed do not necessarily tackle one particular challenge but could have an impact on the mitigation of additional challenges as well. Therefore, based on the strategies developed and assessed, the following four strategy clusters are proposed that need to be tackled in order to improve the current state of intermodal transport in Ethiopia: *digitalization, education, process standardization, and performance tracking and improvement.*

Digitalization: Digitalization of logistics in Ethiopia is in its early stages but could have a dramatic impact on intermodal transport. Derived from the group exercise, digital approaches can assist improvements in multiple ways. First, creating visibility in container and truck locations can assist in the better planning of arrival times at transshipment points and also provide end customers with more information on estimated time of arrival at their location. Second, the need for digital platforms so as to create visibility in capacities and abilities of logistics service providers but also to foster cooperation among them was stated multiple times. Missing cooperation between stakeholders involved was one of the more important challenges, and digital platforms can support the integration of those stakeholders on multi-stakeholder platforms. This could also be beneficial for smaller logistics service providers and trucking companies that seek to better consolidate volumes and gain bargaining power.

Education: Throughout the discussions it became eminently clear that training and education in intermodal transport is necessary on the levels of the government, the company, and the worker in order to improve the current state of affairs. More precisely, the proposal was to improve practice-orientation of university teaching through cooperation between universities and companies, which can provide practice problems to university students, in order to bridge the gap between theory and practice. It was stated that university teaching currently mostly focuses on theoretical content without connection to practical problems. As a result, students coming from the university do not meet the requirements of companies and need a lot of training time before they can contribute. Additionally, the creation of national certifications for certain job profiles as well as vocational training for those job profiles building on the

experience of other countries would assist companies in finding or training more qualified personnel. Moreover, for existing staff, incentives must be found in order to motivate them to obtain further education and training. In total it should be noted that the strategies from this cluster were rated as highly effective and not as complex as other strategies investigated.

Process standardization: From the participants' point of view, stakeholders involved in the process of intermodal transport lack an understanding of processes involved. The joint development of simple and standardized operating procedures—for example for planning, loading and unloading transports, or customs clearance—would assist in improving the efficiency of the whole transport chain.

Performance tracking and improvement: According to the participants' experience, Ethiopian logistic service providers do not track their performance and consequently cannot provide key performance indicators (KPI) to their customers. They also lack an overall understanding of continuous improvement. Therefore, multiple stakeholders agreed that the definition of KPI and the embedding of them into a continuous improvement process is of high importance, and KPI was discussed for multiple challenges on different levels (at the level of the worker, the company, and the supply chain). If the performance of the actors is tracked and thereby made comparable, this will on the one hand lead to more competition and on the other hand provide ideas for improvement potentials. Additionally, during the first stage of NGT it was noted that *monopolistic structures for intermodal transport* dampen the efficiency of transport chains. However, without being able to track the logistics performance via KPI, an assessment of the efficiency of current structures is not possible. Therefore, participants mutually agreed that more quantitative studies on the performance of the current transportation system in Ethiopia are necessary in order to investigate the efficiency of currently implemented monopolistic structures.

However, the discussion also made clear that the development of strategies within those strategy clusters should be supported by governmental commitment and actions. This could be achieved by accelerating policy changes to improve customs clearance, by opening up market structures, by supporting the build-up of vocational training for certain job profiles, or by many other approaches.

5. IMPLICATIONS

Based on a structured research process among 38 professionals that integrated insights of multiple stakeholders, the study provides a holistic picture of current challenges of intermodal transport in Ethiopia and also outlines potential strategies and directions for future improvements. Regarding the challenges, 19 challenges were synthesized that contribute to eight different clusters. It is shown that the challenges Ethiopia faces in order to improve efficiency of intermodal transport are of diverse nature, and besides more traditional transport-mode-related and transshipment-related issues, they also comprise environmental as well as human-related challenges that require different approaches than are required by traditional transport-related issues. The strategies developed and assessed by the group of practitioners were condensed to four areas of action that companies within those transport chains should tackle jointly together with governmental support. The study thereby contributes to research and practice alike.

For research, the study provides a synthesized understanding of the current challenges of intermodal transport in Ethiopia that could be a basis for further investigations in this field. To the best of the author's knowledge, no systematic approach has been undertaken so far to map a holistic picture integrating views of multiple stakeholders on this topic. Therefore, future research in this field should focus more in-depth on particular challenges and contribute more concrete solutions. Therefore, the strategies proposed to improve the current state of intermodal transport have to be understood as first impressions and need further refinement by research and practice.

For practice, the study provides valuable insights on the current state of intermodal transport in Ethiopia based on insights from professionals coming from different industries and institutions. More precisely, the implications can be broken down into the five stakeholder groups that have been mentioned at the beginning.

First, for *governmental institutions* (incl. regulatory bodies) the study provides an overview of the current challenges of efficient intermodal transport. A lot of those challenges, such as customs clearance, foreign currency access, monopolistic inefficiencies, and others, can be

mitigated through effective governmental measures to contribute to export-led growth. It has been clear throughout the discussion process among participants, that efficient transport is often highly impacted by regulations in this field. Especially the challenge of *monopolistic structures for internodal transport* is one of the more important challenges that can be controlled by governmental institutions. Although it has been stated by many participants, that opening up those structures would increase competition and consequently increase logistics efficiency, the flipside of losing control over domestic transport and infrastructure (e.g. railway infrastructure) should be considered.

Second, for *non-governmental institutions* some of the outlined strategy clusters can be addressed from a neutral perspective to contribute to improvements in this field. Especially the strategy cluster of *education* could be tackled by *non-governmental institutions* by providing assistance in developing national certifications for certain job profiles linked to logistics, as well as support the improvement of practice-orientation of university teaching as mentioned earlier.

Third, for *foreign investors and local manufacturers* the study provides valuable insights alike. For companies seeking to enter the Ethiopian market, the study provides insights on what to expect when importing and exporting goods. For companies already active in Ethiopia, the study provides clear directions on which challenges and strategies to focus on when trying to improve logistics performance. However, upon investigation of the challenges and strategies proposed, it becomes obvious that those challenges cannot be tackled by single companies alone, and the efficiency of the processes involved often relies on cooperation and multi-stakeholder approaches.

Fourth, for *local and international logistics service providers* the study stresses their important position in reaching export-led growth of Ethiopia since their actions need to be integrated in order to improve the state of logistics. More precisely, the study showed, that numerous logistics actors (freight forwarders, transport operators, dry port operators, operators at the Port of Djibouti) are involved in intermodal transport but their actions are not well aligned due to contrasting goals and a missing understanding of each other's processes. *Missing cooperation between all stakeholders* as well as *missing processes to integrate transport modes* have been assessed among the five most important challenges of intermodal transport in Ethiopia which underlines the importance of service providers in this field. Cooperation and exchange among them seem to be necessary in order to improve the current state. This could also be fostered by

governmental institutions, supported by non-governmental institutions and manufacturers which again emphasizes that the cooperation of all stakeholders should come first, which starts with improving mutual understanding and must result in joint initiatives.

6. STUDY LIMITATIONS AND OUTLOOK

This study's intent was to provide a broad picture of the current state of intermodal transport in Ethiopia integrating multiple stakeholders. Therefore, the study applied an NGT group exercise among 38 professionals coming from manufacturing and service-provider industries, academia, and governmental as well as non-governmental institutions. The intent was to limit bias through various stages of the research process. However, the study comprises some limitations that need to be discussed.

Although from a methodological perspective, the total amount of 38 participants was appropriate for performing an NGT group exercise, this number constitutes a relatively small sample for assessing the challenges and strategies developed. Although the assessment provides first indications on the peculiarity of the challenges, more fine-tuned analyses by different stakeholder groups and their diverse views on those challenges were not possible. Additionally, the assessment performed was based solely on the individual perceptions and experiences of the professionals involved, leading to a more qualitative assessment rather than a quantitative analysis that can be supported by concrete numbers.

This being said, this study and its results provide a basis for further discussions but require further quantitative studies to draw more reliable conclusions. Nevertheless, the study seeks to open up the discussion on intermodal transport in Ethiopia that will be one of the cornerstones of economic development for one of the fastest growing low-income countries in the world that is on its way to becoming part of global value chains. Efficient logistics is one of the key success factors for achieving the Ethiopian government's goal of becoming the manufacturing hub of Africa by 2025. Therefore, discussions on improving intermodal transport have to be continued by research and practice alike.

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Figure 5—Overview of current challenges of intermodal transport in Ethiopia

	Communicational challenges	Rail-related challenges	Road-related challenges	Ship-related challenges	Transshipment-related challenges
Transport	<ul style="list-style-type: none"> • Missing cooperation between all stakeholders • Non-usage of information systems & integration • Missing transparency on locations, capacities & prices 	<ul style="list-style-type: none"> • No efficient connection of railway to customers / warehouses etc. 	<ul style="list-style-type: none"> • Transport cost (road transportation) • Road availability & conditions • Long and volatile transport times (road) • Truck shortage 	<ul style="list-style-type: none"> • Long and volatile transport times from Djibouti to Europe • Low vessel frequency • No usage of inland waterways 	<ul style="list-style-type: none"> • Missing processes to integrate transport modes
Environment	Regulatory challenges <ul style="list-style-type: none"> • Customs / long clearing times • Monopolistic structures for intermodal transport • Volatile regulations not aligned with practice 	Financial challenges <ul style="list-style-type: none"> • No foreign currency access leads to delays 			
Human Factor	Human-related challenges <ul style="list-style-type: none"> • Inadequate work ethics of worker • Lack of qualified personnel • Business ethics / corruption 				

Figure 6—Assessment of challenges of intermodal transport in Ethiopia

