ANALYZING THE BARRIERS TO INTERNATIONAL TRADE LOGISTICS FROM INDIAN PERSPECTIVE: AN ISM MODELLING APPROACH

Sameer Shekhar, Indian Institute of Foreign Trade (IIFT), New Delhi
Ankit Kesharwani, Indian Institute of Foreign Trade (IIFT), New Delhi

ABSTRACT

The present study is an empirical investigation into the barriers involved in international trade logistics identified from the perspectives of key stakeholders including Indian traders, logistics service providers (LSPs), and academicians. The identified risks were reduced to comprehensive list of barriers by Delphi interview rounds. These barriers have been modelled based on the responses from stakeholders using Interpretive Structural Modelling (ISM). The ISM model has revealed that political barriers, cultural rigidity, policy, and border interventions are the significant factor which guides the efficiency of international logistics services.

Keywords: International Trade Logistics, Barriers, ISM, Interventions, Trade Policy.

INTRODUCTION

International trade growth and development have largely been dependent upon the efficacy of its export-import (EXIM) logistics and supply chain mechanism through which various factors become may either becomes facilitators or cause impediments. To minimize these impediments across various touchpoints, the countries across the globe are making their best effort to make their logistics operation stronger to deliver their goods quickly, and at competitive cost which may lead to increase in their global trade market share. At times, the product quality, cost, and delivery were affected by logistics issues due to which a country suffers loss of trade. The logistics barriers in international perspective certainly possesses different dimensions as compared to the domestic logistics operation – primarily because that EXIM logistics is significantly driven by extant foreign policies, tax structures, relation, culture, connectivity, and interventions etc.

LITERATURE REVIEW & BARRIERS IDENTIFICATION

Takele (2019); Higgins (2012) and Marti et al. (2014) have found *cultural rigidity* as one of the significant barriers to international logistics, as it is concerned with local people's sentiments and their social construct which makes them to resist development and constructions on local level causes hinderance in international logistics. Gunasekaran & Ngai (2003), Mangla et al. (2018) have highlighted that lack of technological advancement in Logistics causes hurdle in seamless operation as it is needed on each step from inspection, documentation to tracking and tracing in international movement of cargo. Kumagai et al. (2013), Junginger et al. (2011), Marti et al. (2014), Edirisinghe (2013), Takele (2019); Buvik (2019) have explained that *geographical impediment* considering distance and difference in topography due to which adopting a uniform logistics chain becomes quite problematic. *Environmental concerns* have also found to be

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seriously considered by the traders across the globe to comply with global sustainable, workers, and environmental protection norms while moving goods through any means including documentation and testing by Wang et al. (2018), and Zaninovic et al. (2020). Varzandeh et al. (2016); and Ouma, Stenmanns and Verne (2019) have mentioned that *interventions at border* is a prime barrier in international trade logistics as it causes delay in delivery as well as increases the cost. White (2010), Parola, Lee, and Ferrari (2006), and Rao and Young (1994) have empirically shown that *political conflict* as great barrier to the efficient international logistics. *Congestion at Ports* (domestic airports & seaports) due to mismanagement, lack of window or lack of space causes delay in loading/unloading and clearance increases the cost of logistics and delay (Shepherd and Hamanaka 2014, Sirisawat and Kiatcharoenpol 2018, and Narayanan *et al.* 2019). Mann (2012), & Marti et al. (2014) in their research have mentioned that non-compliance with the *complex economic and trade policy* penalizes many traders heavily as a result they fail to sustain themselves financially in the policy puzzle. Due to varying policy of different nations interpreting different terms of shipment and the formalities indulged in logistics operations lead to increase in cost, and complexity; thus, adversely affecting the cost competitiveness of the product in international market. *Lack of integrated supply chain* mechanism is also one of the areas which needs to be taken care of to have an efficient logistics operation on global surface (Meersman and Van de Voorde, 2017; Rutner, *et al.* 2003). *Transportation barrier* which includes high transportation cost, and lack of proper air and maritime connectivity has been considered by various researchers impeding international trade logistics (Calatayud, et al. 2017; Gani, 2017).

The above extensive literature review has revealed more than 20 barriers to international trade logistics i.e., such as cultural barriers, social barriers, geographical barriers, political barriers, policy barriers, environmental barrier, border interventions, congestion issues, etc. These barriers were then placed before the logistics professionals, and academician of international supply chain and logistics specialization. The three rounds of Delphi technique have helped to shortlist 10 most relevant barriers perceived by these experts.

RESEARCH METHODOLOGY

Based on shortlisted 10 barriers ISM questionnaire was prepared, and total 33 responses were collected from 22 EXIM traders and 11 LSPs having experience of at least 5 years of export-import business operation. The responses were used to develop the interpretive structural hierarchy which reveals the contextual relationship among the barriers to international trade logistics. To understand the contextual relationship among poorly articulated barriers a focus group discussion is held with five Indian LSPs operating globally. The discussion was made to rule out any ambiguity in the model, and the relations have been interpreted based on their views.

Interpretive Structural Modelling: It is a qualitative method which generate solutions for complex problems through discourses based on the structural mapping of complex interconnections of elements (Saxena and Seth, 2012; Sage 1977). It has been conducted as follows:

Step 1: *Developing Structural Self-Interaction Metrix (SSIM)* – Based on the responses collected from trade and logistics professionals the pair-wise contextual relations/comparison among the

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barriers have been presented in through SSCM (table 1). Four symbols have been used to denote the direction of relationship between the barriers (*i* presented in column and *j* presented in row):

V: Barrier *i* affects Barrier *j* (Barrier *j* can be alleviated by improvement of barrier *i*);

A: Barrier *j* affects Barrier *i;* (Barrier *i* can be alleviated by improvement of barrier *j*);

X: Barriers *i* and *j* influence each other; and

O: Barriers *i* and *j* are unrelated.

Table 1
STRUCTURAL SELF-INTERACTION MATRIX (SSIM)

Barriers	B10	B9	B8	B7	B6	B5	B4	B3	B2
Congestion Barriers (B1)	O	A	A	A	A	V	O	X	V
Geographical Barriers (B2)	O	A	A	A	O	O	O	V	-
Lack of Integrated Logistics (B3)	A	A	A	A	O	O	A	-	
Political Barriers (B4)	A	O	O	O	V	O	-		
Environmental Barriers (B5)	O	A	A	O	A	-			
Policy Barriers (B6)	A	O	O	V	-				
Border Interventions (B7)	O	O	O	-					
Transportation Barriers (B8)	O	A	-						
Technological Barriers (B9)	O	-							
Cultural Barriers (B10)	-								

Step 2: *Reachability Matrix* – The SSIM is transformed into a binary matrix, called the reachability matrix by substituting V, A, X, O by 1 and 0 as per the case. The rules for the substitution of 1's and 0's interprets if the (i, j) entry in the SSIM is V, then the *(i, j)* entry in the reachability matrix becomes 1 and the (j, i) entry becomes 0. If the *(i, j)* entry in the SSIM is A, then the *(i, j)* entry in the reachability matrix becomes 0 and the *(j, i)* entry becomes 1. If the *(i, j)* entry in the SSIM is X, then the (i, j*)* entry in the reachability matrix becomes 1 and the *(j, i)* entry also becomes 1, and if the (i, j*)* entry in the SSIM is O, then the *(i, j)* entry in the reachability matrix becomes 0 and the (j, i) entry also becomes 0.

The final reachability matrix is obtained by incorporating the transitivity as enumerated in Table 2. The transitive link has been denoted as 1^* in the table.

Table 2
STRUCTURAL SELF-INTERACTION MATRIX (SSIM)

Barriers	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10
B1	1	1	1	0	1	0	0	0	0	0
B2	0	1	1	0	0	0	0	0	0	0
B3	1	1*	1	0	0	0	0	0	0	0
B4	0	0	1	1	0	1	0	0	0	0
B5	0	0	0	0	1	0	0	0	0	0
B6	1	0	0	0	1	1	1	0	0	0
B7	1	1	1	0	0	0	1	0	0	0
B8	1	1	1	0	1	0	0	1	1*	0
B9	1	1	1	0	1	0	0	1	1	0
B10	0	0	1	1	0	1	0	0	0	1

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Step 3: *Level Partitioning & Iteration Metrix Development*: The intersection set is drawn from reachability set and antecedent set and partitioning of the final reachability matrix into the different levels have been done as shown in Table 3. The barriers for which both the sets remain same occupy the top level in the ISM hierarchy.

Table 3
PARTITIONING THE FINAL REACHABILITY MATRIX AND ITERATION METRIX

Barrier	Reachability Set	Antecedent set Intersect	Intersection set	Level
1	1,2,3,5,8	1,3,6,7,8,9	1,3,8	II
2	2,3	2,3,7,8,9	2,3	I
3	1,3	1,2,3,4,7,8,9,10	1,3	I
4	3,4,6	4,10	4	VI
5	5	1,5,6,8,9	5	I
6	1,5,6,7	2,4,6,10	6	V
7	1,2,3,7	6,7	7	IV
8	1,2,3,5,8,9	3,8,9	3,8,9	III
9	1,2,3,5,8,9	9	9	III
10	3,4,6,10	4,8,10,12,14,15	4,10	VI

Step 4: Development of Diagraph with transitive links – Based on the levels acquired from Iteration Metrix hierarchical model of the barriers to international logistics has been developed as depicted in Figure 1.

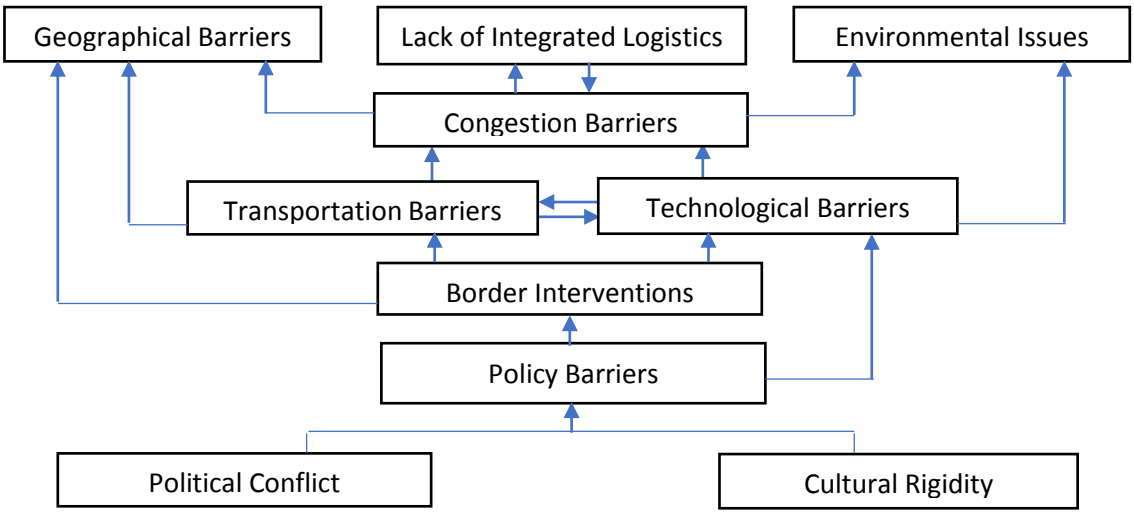

Figure 1
HIERARCHICAL MODELLING OF THE BARRIERS TO INTERNATIONAL TRADE LOGISTICS

The model development based on responses from trade and logistics professional as shown in the diagraph (Figure 1) clearly shows political conflict and cultural rigidity at the base of the model influencing policy measures related to logistics. Interventions at international borders are driven by policy measures and which further affects the transportation efficiency. Policy of a country also allows the use of advanced technology at different stages of logistics operation. The model shows that if the transportation barrier and technological barriers are there, this would

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lead to congestion issue. At the top of the model geographical barrier, lack of integrated logistics, and environmental issues have found their place which means that these are affected by the barriers which have found place below them.

DISCUSSION AND CONCLUSION

The study has been conducted with ten selected barriers to international trade logistics based on the views of Indian exporters/importers and logistics service providers involved in the shipment of goods to different foreign lands clearly. It shows that political conflict and socio-cultural resistance of trade destination countries are significant influencers to the economic and trade policy. Also, the interventions (non-tariff) at international border are due to the existing policy of a country which leads to delay and loss of cost competitiveness not only pertaining to logistics operation but also to the international trade which leads to loss of market share ultimately due to effect on demand. The SSIM Metrix also reveals that geographical barriers, lack of integrated logistics, congestion and environmental issues are having high dependence power whereas technological barriers, transportation barriers, policy barriers and border interventions are having comparatively high driving power. This means the barriers with high dependence power can be solved if the barriers with high driving power are shorted out. Environmental concerns can be taken care of is the congestion issue is solved and the advanced technologies are adopted in material handling, procurement, documentation and testing etc. Looking into the interdependence of the different barriers, the model provides an insight about priority issues in international trade logistics to make it efficient

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