Diving deeper in performance indicators: What do we know about the AEO in Brazil?

Luís Gustavo dos Santos Marques, Anastasia Kondrashova and Cristiano Morini

Abstract

Controls are useful to combat unfair competition, protect consumer health, combat illicit trade and promote development. On the other hand, controls or inefficient processes may affect the flow of trade and may compromise the competitiveness of economic operators. This paper aims to analyse performance indicators related to international trade and cross-border operations from the economic operator perspective. The method compares the analysis of the indicators found in literature to the indicators at the regulatory level. As a result, our study provides a useful opportunity to unveil the authorised economic operator (AEO) indicators in an implementing country.

1. Introduction

The use of performance indicators is vital to any customs administration. It facilitates the communication of the objectives of all actors involved, providing a better level of service.

When using performance indicators, it is possible to measure the quality and effectiveness of the services performed by Customs and other agencies that operate to control foreign trade, as well as reduce uncertainties (Sawhney & Sumukadas, 2005; Ireland & Matsudaira, 2011). On the one hand, companies require certain skills, strategies and competitive advantages to ensure efficiency and profitability. On the other, customs administrations are required to provide a rationalisation of management and efficient and effective use of resources, with special attention to the level of service (Morini, Inácio Jr, Santa-Eulalia & Serafim, 2015; Pomfret, 2010; Sá Porto, Canuto & Morini, 2015).

There is an ocean of metrics and performance indicators regarding trade logistics in literature. Most of them do not fit the cross-border dimension. The Organization for Economic Cooperation and Development (OECD) has trade facilitation indicators (Moïsé & Sorescu, 2013; Moïsé & Sorescu, 2015), as does the World Bank (Hillberry & Zhang, 2015; Wilson, Mann & Otsuki, 2004). Discussing performance indicators in this context provides an opportunity to understand the challenges of being an AEO worldwide. The World Customs Organization (WCO) AEO program is designed to facilitate and secure the international trade in global supply chain operations.

The objective of this paper is to analyse the relationship between the literature related to the cross-border trade operations and performance indicators specified in Brazil's AEO legislation. The research questions are:

Q1: What kinds of performance indicators may an economic operator pursue to become an AEO?

Q2: Do the performance indicators match the trade logistics cross-border indicators in the literature?

This paper considers the theoretical approaches from the literature, and the practical approaches from Brazil's trade regulation that an economic operator must take in the context of customs operations.

Our study aims to provide a useful overview of the AEO performance indicators in Brazil. We aim to contribute to the academic body of literature by exploring a variety of indicators and their application by means of qualitative analysis. By comparing the literature on this subject to the AEO performance indicators in use in Brazil, we hope to offer countries that consider implementing AEO a useful insight.

2. Method

The literature review considered a combination of keywords—'trade', 'international trade', 'international operations', 'international logistics', 'indicators', 'performance indicator', 'border', 'customs' and 'AEO'—in mixed ways. The keywords were used in the following databases: Web of Science, Scopus and Scielo. They have made possible the application of a first filter regarding the pre-selection of articles. Through the site of the Brazilian Revenue Service it was possible to find a large part of the necessary information relating to the Brazilian AEO Program legislation.

Thereby, we expose indicators obtained from the literature and compare them to the indicators found into the Brazilian legislation. We settled the classifications of indicators grouped into families, according to Gunasekaran, Patel and Tirtiroglu (2001) and other selected authors. Gunasekaran et al. (2001) developed a study based on performance measurement systems (PMS) that measures important aspects of a chain of supplies: planning of orders; partnerships in the chain; production; distribution; level of service; customer satisfaction; finance; and logistical costs of the chain. Finally, we analyse the match and frequency of the indicators, unveiling the possibility of using the indicators as outcomes in other countries, considering that the AEO program is in the process of implementation in several countries.

3. Performance indicators

Trade facilitation is a theme used in discussions related to trade liberalisation policies promoted by international organisations such as the World Trade Organization (WTO), the World Bank, the WCO, the United Nations Economic Commission for Europe (UNECE) and the Organization for Economic Cooperation and Development (OECD). Several issues are related to this topic, including the reduction of transaction costs (Williamson, 1981) related to the execution, regulation and administration of trade policies; the environment in which the commercial transactions are made; the need for transparency and professionalism of Customs; and compliance with the standardisation of regional and international settings (Iwanow & Kirkpatrick, 2007; Ireland, Cantens & Yasui, 2011).

Trade facilitation is seen as a mechanism capable of boosting the economy of a country. This can be understood as a set of policies designed to reduce costs of imports and exports. Trade facilitation is not associated only with the simplification and standardisation of customs formalities, but also with administrative procedures related to international trade, the business environment, the quality of infrastructure, and transparency (Grainger, 2011; Marti, Puertas & García, 2014; Portugal-Perez & Wilson, 2010). In developing countries, trade facilitation is considered effective in promoting the diversification of exports. Some approaches adopted by Asia–Pacific Economic Cooperation (APEC) claim that trade facilitation is any policy that reduces the transactional costs of international trade.

By using a gravitational model, Wilson et al. (2004) estimated the impact of trade facilitation on trade flows. Their results reveal large potential increases in trade and in rates of growth in countries that have below-average rates of commercial transactions. Nordas, Pinali and Grosso (2006) focused on the relationship between international trade and logistics, considering time of importation and exportation. Nordas et al. (2006) conclude that the delays result in smaller volumes of trade and reduce the exports in markets that are sensitive to time. Djankov, Freund and Pham (2006) argue that, on average, each additional day of delay before embarking toward its final destination reduces the value of trade by at least one per cent.

Wilson, Mann and Otsuki (2003) used a gravitational model to evaluate the relationship between flows of trade and trade facilitation in the Asia Pacific region. These authors used four indicators that evaluate four different areas of international trade (Table 1).

Table 1: Gravity model of trade facilitation

Port efficiency	Able to evaluate the quality of infrastructure of ports and airports.
Customs environment	Capable of measuring the direct costs and administrative transparency of customs services.
Regulatory environment	Able to assess the economic approach of the regulations.
Use of E-business	Capable of assessing the existence of domestic infrastructure needed in an economy (logistics companies, financial intermediaries, and telecommunications).

Source: Wilson, Mann & Otsuki (2003).

This gravitational model indicated that regulatory barriers and port inefficiency undermine the trade and the progress of Customs. Each one of these indicators has its specificity and purpose in the economy. An indicator, by itself, is able to assist decision-makers in directing them towards measures aimed at the most promising reforms, trainings and negotiations (Wilson et al., 2003; Sá Porto et al., 2015).

Other studies have also helped to identify key performance indicators, such as Portugal-Perez and Wilson (2010). For these authors, two dimensions differentiated the trade facilitation:

- the 'hard' dimension comprises tangible factors related to physical infrastructure and can measure the degree of development and quality of ports, airports, roads and railway lines
- the 'soft' dimension comprises intangible factors such as those that involve transparency, the business environment and the customs administration (time, number of documents required for export and import procedures) and covers the procedures of the business and regulatory environment (as indicators of irregular payments, government transparency and anticorruption measures).

Portugal-Perez and Wilson (2010) used around 20 indicators from various sources, such as Doing Business (DB), World Development Indicators (WDI), World Economic Forum (WEF) and Transparency International (TI), to create four new indicators related to Customs and trade facilitation. The broader aim of this contribution is to estimate the impact that indicators have on trade. A factorial analysis and a statistical modelling technique were employed for the construction of new indicators.

Of the four indicators, two are closer to the 'hard' dimension of trade facilitation:

1. infrastructure
2. information and communication technology.

The other two indicators are related to the 'soft' dimension:

3. efficiency of borders and transport
4. business environment and regulatory environment.

The results indicate that infrastructure is the factor that brings the greatest benefits associated with the growth of exports. However, although improvements in infrastructure are considered relatively expensive, this high cost should be taken into account in the analysis of the cost–benefit ratio. The analyses of the effects of these factors on trade flows, together with simulations and discussions, may promote useful information that will help policy makers seek and prioritise areas where the allocation of resources brings the greatest benefits. These prioritisations have a direct impact on growth, productivity and the development of a country. These studies prove empirically that trade facilitation positively impacts on these issues (Portugal-Perez & Wilson, 2010).

The greater integration between countries, caused by globalisation, is enhanced by the reduction of customs barriers and the commercial opening of many countries. In this sense, it became difficult to distinguish domestic policies from international policies. With the aim of promoting the integration of trade, the opening of markets must be accompanied by a series of complementary policies. These policies call for a smooth functioning of the customs administration, which should promote greater transparency, predictability and a fast clearance of goods (Zamora Torres & Navarro Chavez, 2015).

Customs administrations are vulnerable to rapid change. They are forced to deal with the intensification of international trade and with global threats, such as organised crime and climate change. In this way, Customs should ensure a balance between the simplification of trade and the protection of society (Zamora Torres & Navarro Chavez, 2015).

Zamora Torres and Navarro Chavez (2015) examined the competitiveness of 29 countries, with the main variables that influence the levels of competitiveness of Customs and presented an index derived from the analysis of the degree of competitiveness. Their results showed that all variables used in the study, such as the speed or average time for imports or exports released by Customs; the standardisation of customs procedures; the flow of international trade; and the quality, efficiency and transparency in the services of customs clearance affect the competitiveness of Customs. However, the variables with the greatest importance and influence are taxes and trade flow, followed by quality, efficiency and transparency.

Considering studies from international organisations, one of the most used references regarding performance indicators is the Logistics Performance Index (LPI), published by the World Bank. It uses a set of customs procedures, logistics costs and quality of essential infrastructure for inland transport or maritime (Marti et al., 2014; Demetriades, Bougheas & Morgenroth, 1999).

The low quality of logistics services or their high price can be considered barriers that undermine international trade. In terms of logistics, the majority of obstacles encountered relate to the delivery time that, when not fulfilled, may undermine the credibility of the actors involved. Developing countries are most likely to struggle with these deficiencies. Although Brazil is one of the largest economies in the world, large investments in its logistics sector are required so that the country can be more competitive in the international trade context (Faria, Souza & Vieira, 2015).

Indicators suggest that the best logistic performance depends on price or time, and how easy it is to predict the supply chain performance (Marti et al., 2014). Table 2 highlights the authors' contributions in terms of literature review in cross-border trade logistics operations.

Table 2: Authors and their respective used indicators

Authors	Indicators
Demetriades, Bougheas & Morgenroth (1999)	Logistics Performance Index (LPI) High logistics performance group (HLPG) Low logistics performance group (LLPG) Domestic logistic costs
Hoekman & Nicita (2011)	Cost of trade
Portugal-Perez & Wilson (2010)	Infrastructure Technology of information and communication Efficiency of borders and transport
Korinek & Sourdin (2011)	Tracking and tracing Customs procedures Infrastructure quality
Batista (2012, adapting from Slack, Chambers & Johnston (2007) to trade facilitation	Speed, Dependability, Flexibility, Quality, Cost
Nordas, Pinali & Grosso (2006)	Service level Quality of movement of loads Time
Wilson, Mann &Otsuki (2003)	Customs environment Regulatory environment
Moïsé & Sorescu (2013) **OECD trade facilitation indicators**	Information availability Involvement of the trade community Advance ruling Appeal procedures Fees and charges Formalities – documents Formalities and automation Formalities and procedures Border agency cooperation – internal Border agency cooperation – external Consularisation Governance and impartiality Transit fees and charges Transit formalities Transit guarantee Transit agreements and cooperation

Table 3 depicts all the indicators identified in this study, along with their respective references. These indicators are the same as found in Table 2, but they were classified into three other levels: strategic, tactical and operational. In addition, the indicators were classified as financial or non-financial. Some indicators may be classified as both financial and non-financial as, for example, indicators that cover both the financial management and management policy. The method used for the classification of indicators in Table 3 was developed by Gunasekaran et al. (2001). We combined this classification with the literature review to develop Table 3.

Gunasekaran et al. (2001) stressed the importance of a clear distinction between metrics at strategic, tactical and operational levels. Gunasekaran's work is a seminal paper in supply chain management. Even though it is not focused on cross-border operations, it suits the framework used because of the usefulness of a common language in terms of indicators analysis.

Table 3: Indicators organised according to the methodology of Gunasekaran et al. (2001) combined with the literature review

Level	Indicator	Authors	Financial	Non-financial
Strategic	Logistics Performance Index (LPI)	Demetriades, Bougheas & Morgenroth (1999)		●
	Border agency cooperation – internal	Moïsé & Sorescu (2013)		●
	Border agency cooperation – external	Moïsé & Sorescu (2013)		●
	Advance ruling	Moïsé & Sorescu (2013)		●
	Involvement of the trade community	Moïsé & Sorescu (2013)		●

Level	Indicator	Authors	Financial	Non-financial
Tactical	Domestic logistic costs	Demetriades, Bougheas & Morgenroth (1999)	●	
	Cost of trade	Hoekman & Nicita (2011)	●	
	Infrastructure	Portugal-Perez & Wilson (2010)		●
	Infrastructure quality	Korinek & Sourdin (2011)		●
	High logistics performance group (HLPG)	Demetriades, Bougheas & Morgenroth (1999)		●
	Low logistics performance group (LLPG)	Demetriades, Bougheas & Morgenroth (1999)		●
	Appeal procedures	Moïsé & Sorescu (2013)		●
	Information availability	Moïsé & Sorescu (2013)		●
	Consularisation	Moïsé & Sorescu (2013)		●
	Formalities – documents	Moïsé & Sorescu (2013)		●
	Formalities and automation	Moïsé & Sorescu (2013)		●
	Formalities and procedures	Moïsé & Sorescu (2013)		●
	Technology of information and communication	Portugal-Perez & Wilson (2010)		●

Level	Indicator	Authors	Financial	Non-financial
Operational	Tracking and tracing	Korinek & Sourdin (2011)	●	
	Flexibility	Batista (2012)		●
	Speed	Batista (2012)		●
	Quality	Batista (2012)		●
	Dependability	Batista (2012)		●
	Time	Nordas, Pinali & Grosso (2006)		●
	Governance and impartiality	Moïsé & Sorescu (2013)		●
	Customs environment	Wilson, Mann & Otsuki (2003)		●
	Customs procedures	Korinek & Sourdin (2011)		●
	Service level	Nordas, Pinali & Grosso (2006)		●
	Cost	Batista (2012)	●	
	Quality of movement of loads	Nordas, Pinali & Grosso (2006)		●
	Transit fees and charges	Moïsé & Sorescu (2013)	●	
	Fees and charges	Moïsé & Sorescu (2013)	●	
	Transit formalities	Moïsé & Sorescu (2013)		●
	Transit guarantee	Moïsé & Sorescu (2013)		●
	Transit agreements and cooperation	Moïsé & Sorescu (2013)		●
	Regulatory environment	Wilson, Mann & Otsuki (2003)		●
	Efficiency of borders and transport	Portugal-Perez & Wilson (2010)		●

The division of levels of indicators is based on the term or focus of each one. The strategic level refers to indicators with a focus on the long term. The tactical level has a greater focus in the medium term, while the operational level has a focus on routine tasks and is short term. As shown in Table 3, the majority of the indicators identified by the literature are non-financial, even though they might have a correlation with finance.

4. AEO in Brazil

The world has witnessed a rise in the process of globalisation since the end of the 20th century. In many countries this process has caused a rapid increase in the flows of goods, people, information and services. Although this brings a growth to the world economy, it is also considered to make countries vulnerable to terrorism. Various terrorist factions throughout the world take advantage of this great trade flow to transport illicit goods. Examples of these criminal practices include trafficking of drugs, money laundering, arms trafficking and smuggling (Receita Federal do Brasil [RFB], 2017).

Looking for a greater dynamism of trade flows and making them more agile without losing the effectiveness of controls of goods, several countries have adopted the AEO based on the recommendations of the WCO (RFB, 2017). Karlsson (2017, p. 25) states there is no contradiction between facilitation and security, 'since a simplified process is easier to secure and a safe process is easier to facilitate'.

According to Hintsa, Urciuoli and Tan (2016), AEO benefits may be related to the following macro categories:

- more streamlined and simplified customs (and related) procedures
- less frequent interventions by customs administration
- increased priority over non-AEO companies (getting to the front of the queue)
- increased (positive) attention by customs administrations
- increased number of other privileges granted by customs administrations.

There are a number of papers that have analysed AEO programs, or C-TPAT (Customs Trade Partnership against Terrorism in the US). Aspects of the program covered by the papers include:

- impact on encouraging international supply chain partnerships (Sheu, Lee & Niehoff, 2006)
- use of IT (Butter, Liu & Tan, 2012)
- administrative innovation (Melnik, Ritchie & Calantone, 2013)
- role of C-TPAT in improving security, resilience and firm performance in a context of public-private partnership (PPP) and relational security (Voss & Williams, 2013)
- ability to boost export numbers (Schramm, 2015)
- attraction of customers or improvements to business relationships (Urciuoli & Ekwall, 2015)
- streamlining customs procedures (Travassos, Navarro & Morini, 2015)
- minimisation of risks (Ni, Melnyk, Ritchie & Flynn, 2016)
- improved competitiveness (Houe & Murphy, 2018)
- performance over PPP (Campos, Morini, Moraes & Inácio Jr, 2018; Park & Park, 2018).

Each country has its own AEO program under international standardisation regulation that might require companies that wish to be certified to implement security standards. In order for these companies to obtain certification they must prove that their processes are reliable and predictable; customs administrations may then focus their efforts on more closely monitoring non-certified entities that might present greater risks in their cargo streams and operations (Travassos et al., 2015).

The Brazilian Program of AEO is based on a certification granted by Customs to the importer, exporter, transporter, cargo agent, depositary of goods under customs control, port operator or airport operator. This certification gives the company the status of being considered secure and reliable in its operations. It is also important to mention it is a program of voluntary compliance of overlapping security criteria in the supply chain (García, 2008; Travassos et al., 2015).

The AEO program in Brazil is under implementation. The first phase was launched in December 2014, and in 2018 it is expected to have other public control agencies aggregated, such as the Sanitation Agency. The Brazilian AEO program lists the following benefits (Table 4).

Table 4: AEO benefits in Brazil

a	Greater agility and predictability in the flow of international trade
b	Improvement in risk management of customs operations
c	Harmonisation of working processes with other regulatory bodies of foreign trade
d	Good relationship between economic operators and the Secretariat of the Federal Revenue of Brazil (RFB)
e	Publish the name of the operator at the site of the RFB as a certified company
f	Benefits of Mutual Recognition Agreements (MRA) signed with other countries
g	Cooperation in consultative forum for legislation changes
h	Possibility to attend seminars, trainings, and events organised by the AEO Centre
i	Dedicated channel of communication with customs administration
j	Priority in analysis of the customs declarations and inspections (when applicable)
k	Low level of physical inspections
l	Waiver of guarantee for customs transit
m	Waiver of guarantee for temporary admission (under economic purposes)
n	Green channel for temporary admission
o	Pre-arrival customs clearance
p	Easiness of access the AEO system through the Siscomex Single Window

Source: Receita Federal do Brasil (2017b).

The certification process examines firstly the admissibility requirements, which identifies whether the operator is able to participate in the certification process for AEO. The eligibility criteria are then used to determine the reliability of the economic operator. These two steps are applied in all categories of certification. After examining these steps the specific criteria are analysed by modality: security criteria and/or compliance criteria (RFB, 2017). Admissibility requirements are show in Table 5. Additional criteria are required specific type of certification (AEO-S, AEO-C, and AEO-P).

Table 5: Admissibility requirements requested by the Brazilian Customs Administration

a.	Adherence to the electronic tax domicile
b.	Adherence to digital bookkeeping
c.	Tax compliance
d.	Registration as a legal entity (more than 24 months)
e.	Acting as an eligible participant for AEO certification
f.	No request rejection in the last six months

Source: Receita Federal do Brasil (2015) and Regulatory Instruction RFB 1834/2018.

5. Discussion and results

After analysing the current legislation (Regulatory Instructions RFB 1598/2015, 1624/2016, 1653/2016, 1736/2017, and Portaria Coana 59/2016), indicators based on four criteria were identified, with a focus in the economic operator: security, risk, compliance and eligibility. In accordance with legislation, the following documents are needed: the application for AEO certification; the self-assessment questionnaire (literally a copy from the WCO); and the complementary validation report. Table 4 summarises the AEO Brazil indicators (grouped in major and minor indicators). The criteria used for classification in Table 6 are the same as those used in Table 3.

Table 6: Brazilian AEO grouped indicators organised according to the methodology of Gunasekaran et al. (2001), and possible match to the literature review

Level	Indicator (from legislation)	Financial	Non-financial	Literature review
Strategic	Integrity of computerised systems		●	Portugal-Perez &Wilson (2010); Batista (2012)
	Integral and specific treatment of goods		●	Batista (2012)
	Review and adjust policy of compliance		●	Korinek & Sourdin (2011)
	Special customs regime		●	Korinek & Sourdin (2011)
	Computerised systems (digital fiscal bookkeeping, electronic tax residence)		●	Portugal-Perez &Wilson (2010); Moïsé &Sorescu (2013)
	Strong financial situation	●		Hoekman & Nicita (2011)
	Impact on the financial solvency	●		Hoekman & Nicita (2011)
	Policy of selection of trade partners	●	●	Moïsé & Sorescu (2013)
	Policy of selection of human resources	●	●	No match

Level	Indicator (from legislation)	Financial	Non-financial	Literature review
Tactical	Physical security of loading units in storage		●	Portugal-Perez & Wilson (2010)
	Awareness of threats and identification of vulnerabilities		●	Korinek & Sourdin (2011)
	Integrity of accounting data		●	Batista (2012)
	Regularity of documents of customs declarations		●	Hoekman & Nicita (2011); Batista (2012); Wilson, Mann & Otsuki (2003); Moïsé & Sorescu (2013)
	Detection and prevention of infractions		●	Batista (2012)
	Confidentiality and integrity of information		●	Portugal-Perez &Wilson (2010); Batista (2012)
	Control and audit of trading partners		●	Batista (2012)

Level	Indicator (from legislation)	Financial	Non-financial	Literature review
Operational	Identification of high-risk loads		●	Nordas, Pinali & Grosso (2006)
	Training relating to the physical security of cargo		●	Batista (2012)
	Pre-inspection of loading units		●	Nordas, Pinali & Grosso (2006)
	Integrity of seals		●	Portugal-Perez & Wilson (2010); Batista (2012)
	Identification of unauthorised persons or vehicles		●	Demetriades, Bougheas & Morgenroth (1999)
	Access control facilities		●	Batista (2012)
	Monitoring cargo transportation		●	Demetriades, Bougheas & Morgenroth (1999); Korinek & Sourdin (2011); Nordas, Pinali & Grosso (2006); Moïsé & Sorescu (2013)
	Control of cargo volumes in certain areas		●	Nordas, Pinali & Grosso (2006); Moïsé & Sorescu (2013)
	Monitoring facilities		●	Batista (2012)
	Uniformity of harmonised system (HS) for tariff classification of goods		●	Wilson, Mann & Otsuki (2003)
	Control of deadlines		●	Korinek & Sourdin (2011); Batista (2012)
	Exchange rate monitoring		●	Hoekman & Nicita (2011); Wilson, Mann & Otsuki (2003)
	Uniformity of description of goods		●	Wilson, Mann & Otsuki (2003)
	Physical security of computer equipment		●	Portugal-Perez & Wilson (2010)

Each AEO indicator has a relationship with at least one set of indicators in Table 2. Some indicators in Table 6 are associated with more than one set of indicators. Figure 1 illustrates the conclusions gathered from Table 6.

*Figure 1: AEO indicators according to the Gunesekaran et al. (2001) method*
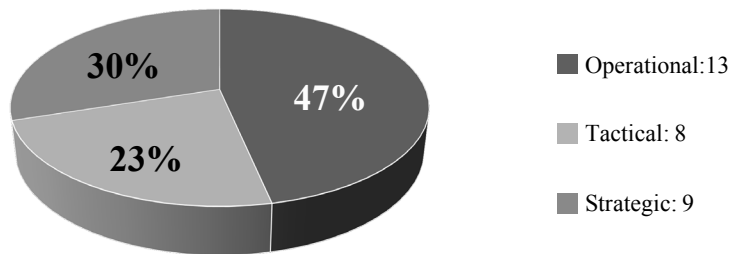
Findings show that the majority of the indicators selected are indicators relating to short-term or daily activities: 47 per cent of the indicators are operational; 23 per cent of the indicators are tactical; and 30 per cent of the indicators are strategic. This indicates that an operator who wished to become an AEO will devote much of the time adjusting their tasks in the short term.

From the associations made in Table 6, it was possible to identify that the indicators related to the AEO certification in Brazil greatly corresponds to the indicators cited by Batista (2012). Surprisingly, Batista (2012) used a Delphi method to set up his framework in the Brazilian expert community. Findings may confirm the Batista's framework for border-crossing operation, considering speed, dependability, flexibility, and quality, except cost.

As shown in Figure 2, 28.57 per cent of the AEO Brazilian indicators have convergence to Batista's paper. This percentage represents 12 indicators that are closely related to speed, flexibility, dependability and quality. A major concern of AEO indicators is in tune with the operational level. In parallel with the 'speed' indicator, it confirms a focus on agility of operations and the success of them within the target period. Finally, related to 'dependability' and 'quality' note processes regarding efficiency and effectiveness in operations. It is important to note that we did not consider OECD indicators (Moïsé & Sorescu, 2013), as many countries have already considered them for policy making.

Figure 2: Authors found in literature and the matched indicators
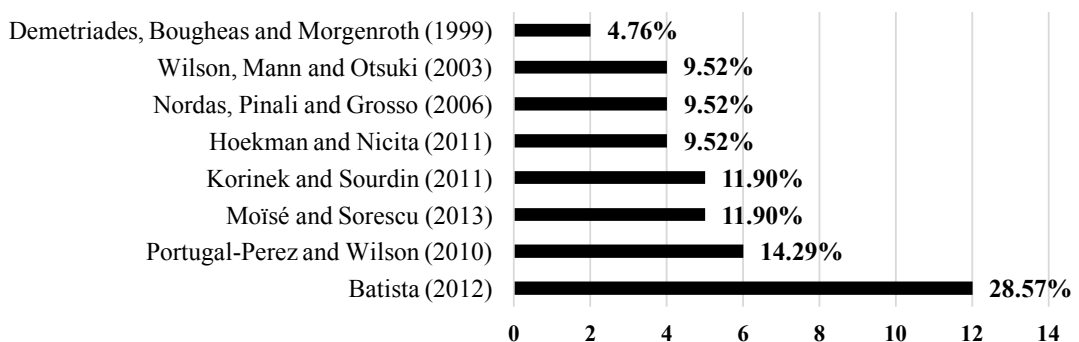
The second set of indicators that had more associations with the AEO indicators are the indicators cited in the work of Portugal-Perez and Wilson (2010). They are infrastructure, information technology and communication, and efficiency of borders and transport. Figure 2 illustrates that 14.29 per cent of selected indicators are compared with the indicators cited by Portugal-Perez and Wilson (2010).

Infrastructure is the indicator that draws most attention for being considered by the authors as the one which has the greatest impact on exports. Although changes in infrastructure are considered expensive, an AEO that has at its disposal an excellent infrastructure has great advantages in relation to the cost–benefit ratio.

The sets of indicators cited by Korinek and Sourdin (2011) and Moïsé and Sorescu (2013) occupy the third position with 11.9 per cent each. This set of indicators also represents the focus of the AEO in Brazil, both in the relations of the supply chain and in the control of operations. Figure 2 shows that Hoekman and Nicita (2011), Nordas et al. (2006) and Wilson et al. (2003) make the same number of associations with the set of AEO indicators.

The division between financial and non-financial indicators (Figure 3) revealed a number of financial indicators in the AEO certification in Brazil, which confirms the emphasis of the AEO in logistical issues and security. From Figure 3 it can be seen that 6.67 per cent of selected indicators are considered financial ones. This does not mean that there is no relationship of the indicator with issues involving financial expenditure but represents that this is not the major focus of the indicators.

Figure 3. Financial and non-financial indicators

■ 26 non-financial indicators

■ 2 financial indicators

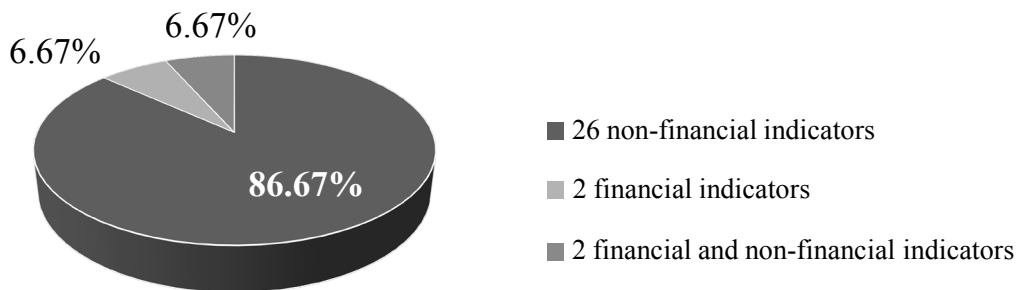■ 2 financial and non-financial indicators

Figure 4 synthesises the results in terms of author's frequencies identified in the literature, level of analysis, financial or not in the AEO program in Brazil.

Figure 4. Matching figure – AEO Brazil performance indicators

6. Conclusions

Some frameworks for performance indicators related to logistics and trade facilitation are possible to find. Probably the most cited is Gunasekaran et al. (2001) and OECD. However, the topic of performance indicators is unusual in the context of AEO. There is no known framework in use currently.

Holloway (2010) asserts performance indicators must be used considering different groups, as economic operators, and different government agencies, in the disaggregated level. This paper analysed the most commonly used indicators in cross-border trade logistics, from the economic operator perspective.

Next, we compared the category and the usage of the indicator found to the performance indicators set out in the AEO legislation in Brazil. Indicators match to non-financial aspects, with emphasis on quality and compliance; flexibility and dependability; and speed in processes involved in releasing goods at borders. There is neither direct involvement in the cost reduction nor financial benefit. In this way, we answered Q1 (What kind of performance indicators are being considered to assess whether a company can become an AEO in Brazil?)

Considering Q2 (Do they match to the trade logistics cross-border indicators in literature?), results are strongly in line to Batista (2012). Although Batista's work focuses on port efficiency, regulatory environment and e-business usage beyond the customs environment as constructs.

The analysis of the indicators in only one level and their interpretation could be a limitation of this work. Some indicators could be considered on different levels (operational, tactical or strategic), due to the subjectivity of the analysis. However, the implementing country could fit the analysis of the levels within its own reality, considering own constraints and objectives. According to Cantens, Ireland and Raballand (2013), metrics should not the copied from one experiencing country to another. It is necessary to consider and adapt them to local constraints.

An important aspect of the current paper is the reproducibility. Follow the same methodology, other researchers can confirm the findings. After fifteen years since the beginning of AEO implementation worldwide, it may be time to delve deeper into performance indicators in the context of AEO, especially in implementing countries, like Brazil. Future questions should consider whether, after AEO implementation, what level of improvement in enforcement is visible? Is it possible to identify the increased number of seized goods? To what extent have exports increased? In terms of competitiveness, do countries improve their position in global value chains? How well?

This work may contribute to performance indicators not associated to cost reduction or financial ones. Another insight from this paper is that there is no special treatment for small and medium enterprises (SMEs). The investment cost to be AEO may not be attractive to SMEs. Future research could focus on cross-functional indicators encompassing AEO and single window, integrated AEO, and AEO in mutual recognition agreements, considering also the public management perspective in this context.

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Luís Gustavo dos Santos Marques

Luís Gustavo dos Santos Marques is a Brazilian researcher in international trade issues at the Laboratory of Entrepreneurship, Innovation, and International Trade (LEICI), at the Applied Sciences Faculty (FCA), University of Campinas (Unicamp), Brazil. He also works with manufacturing in a multinational company in Campinas. His current research issue is related to the Authorized Economic Operator (AEO) in a mixed theoretical and practical perspective.

Anastasia Kondrashova

Anastasia Kondrashova holds a masters degree in Business Administration and Economy and a masters degree in Customs and Supply Chain Compliance, the latter from the Rotterdam School of Management. Her thesis focussed on intercultural logistics. During her career in the Tax and Customs Service of the Netherlands, she served as a Training Coordinator and Project Manager for International Cooperation. Subsequently, she worked as a Project Manager and Economic Officer at the Embassy of the Kingdom of the Netherlands in Moscow, Russia. She is currently enjoying a sabbatical in Brasília, Brazil but remains open to professional opportunities.

Cristiano Morini

Cristiano Morini is a researcher and professor in global supply chain operations, trade facilitation, entrepreneurship, and performance indicators. He has published over 30 articles in academic journals and proceedings and five books related to international trade, supply chain, and international organisations. He has professional background in both the public and private sector. In public sector worked at Ministry of Justice, in Brasilia, Brazil. In the private sector, he worked at the Logistics department in an automotive industry. In academia, he is teaching trade topics since 1998. Since 2012, he is full time professor and researcher at the University of Campinas (Unicamp), Brazil.