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A framework for voluntary business-government information sharing

Boriana Rukanova[a,*], Yao-Hua Tan[a], Roel Huiden[b], Anil Ravulakollu[a], Andrew Grainger[c], Frank Heijmann[d]

[a] Delft University of Technology, Jaffalaan 5, 2628 BX Delft, the Netherlands
[b] Royal FloraHolland, Middel Broekweg 29, 2675 KB Honselersdijk, the Netherlands
[c] Nottingham University Business School, UK
[d] Customs Administration of the Netherlands, Laan op Zuid 45, 3072 DB Rotterdam, the Netherlands

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ABSTRACT

Over the last few decades, businesses have developed sophisticated information systems that allow the capture of vast amounts of data. Such data can be potentially useful for enabling government authorities to improve their processes and services. For example, access to business documents and track and trace information associated with supply chain activities is of great interest to customs administrations. Such information holds the potential to make customs risk assessment processes more efficient and effective and to enable faster clearance of goods crossing borders. Businesses, however, are often not willing to voluntarily share information with the government beyond what is strictly mandated to be shared by law (e.g. submitting customs declarations). There is only limited academic research and a general lack of understanding amongst practitioners about how voluntary business-government information sharing can be achieved. In this study, we present a framework to analyse the barriers, drivers, and enablers of voluntary business-government information sharing and the governance processes that make such voluntary information sharing possible. Our analysis shows that voluntary business-government information sharing can succeed when there are strong drivers and a government agency willing to take the lead in initiating the process.

1. Introduction

With growing digitisation, there is a large amount of data that resides within the digital infrastructure of the private and the public sector. Such information holds the potential to help government agencies improve their services and value to the public. Still, government agencies have limited access to such information and would need to engage in information sharing negotiations in order to obtain access. Earlier research has focussed on information sharing amongst government agencies. Gil-Garcia (2012) thus proposed that governments can gain additional benefits if they engage in information sharing initiatives across various levels of government, with governments from different countries, multiple branches of government, non-for-profit organisations, and businesses. Recent research on data collaboratives echoes further these ideas (Susha & Gil-Garcia, 2019; Susha, Jannsen, & Verhulst, 2017; Verhulst & Sangokoya, 2015; Verhulst, Young, & Srinivasan, 2017).

In this paper, we focus on business-government information sharing that is conducted on a voluntary basis[1]. In practice, there is already a long history of businesses sharing mandatory data with government, based on legal and regulatory requirements. In the case of customs and taxation, such information sharing was initially on paper with paper-based tax and customs declarations that are now submitted electronically (see e.g. Rukanova, Wigand, van Stijn, & Tan, 2015). However, relying only on the information that is shared on a mandatory basis is often not enough. In international cross-border trade the regulatory mandated data provided by the business community, e.g. the customs import or export declaration, is often not sufficient for customs to

* Corresponding author.
E-mail addresses: b.d.rukanova@tudelft.nl (B. Rukanova), y.tan@tudelft.nl (Y.-H. Tan), roelhuiden@royalfloraholland.com (R. Huiden), anilrvbs@gmail.com (A. Ravulakollu), grainger@tradefacilitation.co.uk (A. Grainger), fha.heijmann@belastingdienst.nl (F. Heijmann).

[1] It is important to distinguish that information sharing can take different forms. For example Shaw, Achuthan, Sharma, and Grainger (2018) explain how government (by reference to the case of UK ports) is able to solicit useful information from stakeholders by orchestrating information sharing with limited resources. However the information sharing in this study is largely relying on human-to-human communication and collaboration. In our context we focus on information sharing of data and documents that is to a large extent structured (e.g. business documents, customs declarations) and shared via computerised information systems and digital infrastructures.

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conduct an effective risk-assessment on the goods that cross their borders, and this results in delays and extra costs. Voluntary use of business data via digital trade infrastructures and data pipelines (Baida, Rukanova, & Liu, 2008; Hesketh, 2010; Tan, Bjørn-Andersen, Klein, & Rukanova, 2011), and the subsequent deployment of data analytics (Rukanova et al., 2019; Rukanova et al., 2020) are seen as promising ways forward to help customs improve their risk assessment processes. A key issue, however, is that no matter how valuable this business information is to the authorities, they often have no formal instruments to access such information. Moreover, business information from documents, such as purchase orders, invoices, packing lists), is commercially sensitive, so companies are reluctant to share it with other parties than those that are directly involved in their commercial operations. Therefore, voluntary information sharing is extremely challenging and relies heavily on articulating benefits and finding the right incentives for all parties involved (Gascó, Feng, & Gil-Garcia, 2018; Susha & Gil-Garcia, 2019). Another major challenge relates to governance (Emerson, Nabatchi, & Balogh, 2012; Rukanova, Henningsson, Henriksen, & Tan, 2018; Susha & Gil-Garcia, 2019) since voluntary information sharing arrangements involve a complex network of business and government actors which have their own interests, but need to engage in a process and work together to achieve the voluntary sharing.

So far, research about the topic of voluntary business-government information sharing is limited (Gascó, Feng, & Gil-Garcia, 2018; Susha & Gil-Garcia, 2019; Rukanova, Huiden, & Tan, 2017); this paper seeks to help fill that gap. The main questions that we aim to explore in this paper are: *Can voluntary information sharing of business data with government bring benefits? What are the factors that influence the voluntary information sharing? What are the governance processes for such information sharing to be achieved?* To address these questions, we developed a *Framework for voluntary business-government information sharing*. We applied this framework to the international trade in flowers with specific focus on imports from Kenya to the Netherlands. Based on research findings, we further developed and enhanced the framework.

The remaining part of this paper is structured as follows: In Section 2, we present theoretical background on information sharing from the business and government literature. Our initial conceptual framework is presented in Section 3. Section 4 discusses our interpretative case methodology. In Section 5 we introduce the case study domain. The case analysis is presented in Section 6. Section 7 discusses the findings and the enhanced framework, while the paper ends with conclusions and recommendations.

2. Theoretical background

This section presents a literature review regarding information sharing within the business and government domains. We then discuss research on voluntary information sharing in the international trade domain, followed by a section on governance. These theoretical insights gained form the basis for our initial framework for voluntary business-government information sharing, which is subsequently presented in Section 3.

2.1. Information sharing in the public and private domain

Over the last few decades, public organisations have experienced a shift from a model focusing on information protection to a model, where cross-organisational information sharing is put at the forefront (Dawes, 1996; Yang & Maxwell, 2011). Based on their literature review, Yang and Maxwell (2011) conclude that various factors from three perspectives (i.e. technological, organisational and managerial, as well as political and policy perspectives) can influence inter-organisational information sharing in the public sector. Examples of technological factors are: heterogeneous hardware, software and information systems; information security; information technology outsourcing; and information technology capabilities. The organisational and managerial perspectives include a long list of factors. While we will not list all of them, examples include: organisational boundaries and bureaucracy; competing interests/self-interest; incentives and rewards; as well as leadership. Factors related to the political and policy perspectives include: legislation and policies; as well as information and power. Furthermore, research has argued that compatibility of technical infrastructures and formally assigned project managers are two of the most important predictors in explaining the success of inter-organisational information sharing initiatives (Gil-Garcia & Sayogo, 2016).

Researchers in the government domain have also advocated pushing the boundaries of the analysis, thus taking a broader perspective. For example, Gil-Garcia (2012) advocates moving the analysis beyond collaboration and information sharing between agencies within a single level of government, to a broader setting which would include also various levels of government, governments from different countries, multiple branches of government, and other actors such as non-for-profit organisations and private firms (Gil-Garcia, 2012). Collaboration, as well as data sharing that spans beyond the government domain, including both government and private actors, have also been advocated by other researchers (Gascó et al., 2018; Susha et al., 2017; Susha & Gil-Garcia, 2019; Verhulst et al., 2017; Verhulst & Sangokoya, 2015). Furthermore, in the context of smart disclosure, prior research (e.g. Zhang, Liu, Sayogo, Picazo-Vela, & Luna-Reyes, 2016) brings attention to the importance of institutions. Similarly, Luciano et al. (2017) examine the building of a certification and inspection data infrastructure to promote transparent markets. Recent research (e.g. Gascó et al., 2018) points out that there is very limited understanding of how voluntary sharing of business data with government can generate value and what the incentives are for such a voluntary sharing to take place.

The benefits of information sharing and the consequences of not sharing have been widely discussed in the academic business literature and both the practitioner's business literature (e.g., Dyer & Nobeoka, 2000; Lee, Padmanabhan, & Whang, 2004; Rai, Patnayakuni, & Seth, 2006; Wigand, Picot, & Reichwald, 1997). Looking back at the evolution of the information science field, the idea of complex systems is now a dominant theme within contemporary research. It was recognised that there is a need to move beyond the micro-level interactions among individual companies and focus on industry (including industry standards) and multi-level interactions (Damsgaard & Lyytinen, 1998; Johnston & Gregor, 2000; Rukanova et al., 2015). Research has also acknowledged the need for explicitly considering the complexities related to inter-organisational systems that transcend national borders, the so-called transnational information systems (Cavaye, 1997). Subsequently, information infrastructures (Ciborra & Hanseth, 2000; Hanseth & Lyytinen, 2010) and platforms (Gawer, 2009)- to reflect the highly inter-connected nature of contemporary information systems and the vast amount of data available there- have become dominant themes within the literature too.

There are obvious differences in the motivation for information sharing in the public and private domains. Inter-organisational information sharing within businesses is usually driven by efficiency gains and generation of business benefits, while in the public domain, inter-organisational collaboration and sharing of information is required when social problems that go beyond the capabilities of a single organisation or jurisdiction need to be addressed (Dawes, Cresswell, & Pardo, 2009). However, despite these differences, it seems that these two streams of research have identified similar complexities. Both streams of research identify the complexity of moving across national borders and discuss the importance of considering multiple levels of analysis. There is also growing awareness and recognition of the interdependence between business and government in the context of information sharing, within both streams of research.

2.2. Voluntary information sharing in the international trade domain

The area of international trade is an example of a domain where

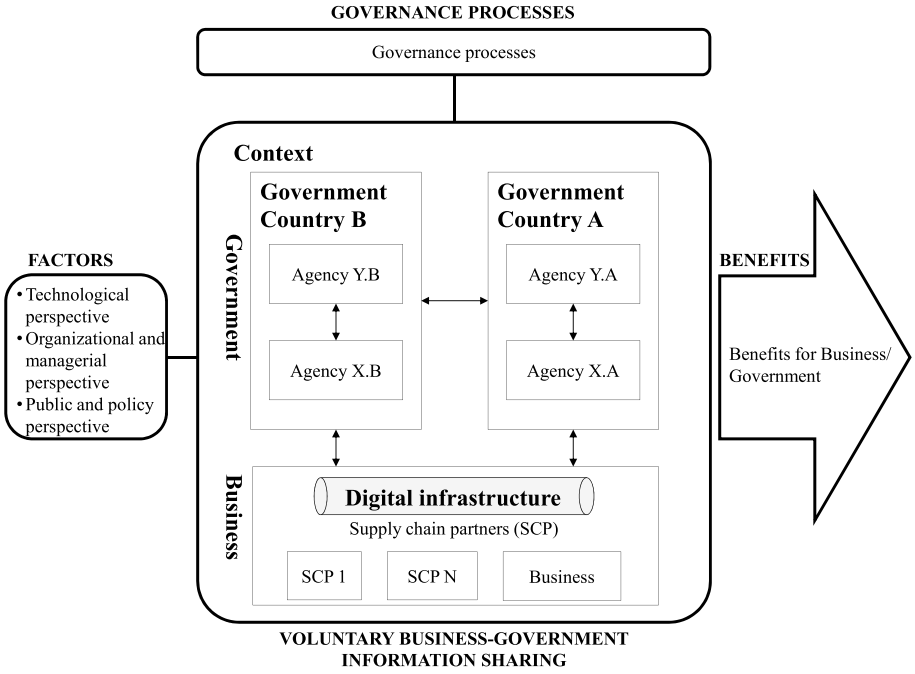

Fig. 1. Initial framework for voluntary business-government information sharing.

business and government information sharing are tightly intertwined. The reason for this tight inter-relationship is that when it comes to cross-border flows, government (represented by customs and other authorities) is responsible for controlling the flow of goods, thus any delay due to customs processes can lead to a direct disruption of the supply chain operations with related costs for the business involved. Over the last few decades, businesses and government have been collaborating to look for innovative concepts for ensuring more effective border controls (Tan et al., 2011) by differentiating between trusted and less trusted traders, and trade flows. The idea of reusing business data, such as purchase orders, invoices, packing lists from the source party in the supply chain, e.g. seller or buyer, for government control purposes has been widely discussed in the literature in the context of international trade (Baida et al., 2008; Hesketh, 2010; Jensen, Vatrapu, & Bjorn-Andersen, 2017; Klievink et al., 2012; Tan et al., 2011). Hesketh (2010) recommended the setting up of a seamless and integrated electronic data pipeline. This data pipeline was intended to reduce fragmentation of information within the supply chains and to allow government authorities to access business information from the source (provided on voluntary basis). The data pipeline can be seen as an information system innovation that enables capturing data at its source (Klievink et al., 2012). The data pipeline concept is based on the idea that the information systems of different parties in a supply chain are interlinked (a sort of "Internet for logistics") and authorised parties can access available data via the data pipeline. If the business parties agree voluntarily to share additional business data with customs, then customs can access this extra data (e.g. purchase orders, invoices, packing lists, etc.)- made available via the data pipeline from the respective systems of buyers, sellers and their logistics service providers- to cross-validate the accuracy of the submitted declarations of the imported or exported goods. Rukanova et al. (2018) developed a framework to help analyse digital trade infrastructure developments such as the data pipeline. They propose to analyse three aspects to better understand digital trade infrastructures, namely: (1) architecture, which allows to make explicit the business and government actors that are involved in information sharing; (2) the process of initiation and upscaling of the digital trade infrastructures; and (3) the governance aspect which also includes cost-benefit articulation for parties involved in order to incentivise commercial parties to make the investments required to participate in a digital trade infrastructure. In the context of voluntary information sharing, this governance aspect is particularly important and we further elaborate on it in the next section.

2.3. Network governance

Voluntary business-government information sharing requires collaborative efforts of parties driven by different motivations and concerns. In this context, the governance processes to enable voluntary information sharing require the management of different drivers, motivations, and related incentives of the parties involved, in a situation where government is not in a dominant position but simply an equal party. This raises the issue of distributed governance. In the context of this paper, we define governance as “all processes of governing, whether undertaken by a government, market, or network, whether over a family, tribe, formal or informal organisation, or territory, and whether through laws, norms, power, or language.” (Bevir, 2013, p. 1). We focus, in particular, on governance processes where multiple different organisations are involved. Earlier research that examines issues relevant to our study include research on network governance, i.e. governance of “three or more legally autonomous organisations that work together to achieve not only their own goals but also a collective goal” Provan & Kenis (2008, p.3). Provan and Kenis (2008) argue that goal-directed organisational networks (in our case goal-directed would mean achieving voluntary business-government information sharing) require some form of governance in order to ensure that participants engage in collective and mutually supportive action, that conflicts are addressed, and that the necessary resources are properly allocated and utilised. Another stream of research that studies similar processes is the research on collaborative governance (Emerson et al., 2012; Susha & Gil-Garcia, 2019). As we are interested in voluntary business-government information sharing, we need to follow and better understand governance processes within a multi-actor context, including business and government actors where government does not have formal power.

3. Theoretical framework

This section presents our theoretical framework (see Fig. 1) called a *Framework for voluntary business-government information sharing*. The

central part of the framework is inspired by Gil-Garcia (2012) who proposed to look at a broader inter-organisational information sharing that goes beyond the single level of government. We also build upon the digital trade infrastructure framework (Rukanova et al., 2018) which addresses the interactions between business digital infrastructures (such as data pipelines) and multiple levels of (inter-) national governments that can access and make use of company data available in these business infrastructures. The central part of our framework is aimed at helping to understand and make explicit the context of a specific voluntary business-government information sharing initiative. In our framework (see Fig. 1) we distinguish between business and government actors.

On the business side, we also included the concept of digital infrastructure such as a data pipeline that enables business-to-business (B2B) information sharing. On the government side we represented different agencies that share information nationally (in Fig. 1, we represented two agencies, e.g. Agency X and Y in country A, but more agencies can be added if needed). We also capture information sharing internationally between governments (in Fig. 1, this is represented as information sharing between governments of Country A and Country B). The big arrow, labelled as "business and government benefits" in Fig. 1, represents the articulation of the benefits from the voluntary sharing.

In our framework in Fig. 1, we included the concept of factors that influence the voluntary business-government information sharing. In particular, we used the factors identified by Yan and Maxwell (Yang and Maxwell, 2011). In their study, Yang and Maxwell provide a very extensive list of factors that influence inter-organisational information sharing in government, clustered along three perspectives. These are: (1) technological; (2) organisational and managerial; and (3) political and policy. In order to keep our initial conceptual framework simple, in Fig. 1, only the perspectives of factors identified in Yang and Maxwell's (2011) list are represented. However, in our analysis, the full list of factors is used when applying our framework in order to identify which of these are relevant in the specific context of the voluntary business-government information sharing.

While an understanding of these factors is useful, they also provide for a static analysis. Earlier research has advocated that a processual and contextualist approach to understanding change brings benefits as it allows for a more dynamic understanding of how processes develop over time in a longitudinal historical context (Pettigrew, 1990). Therefore, in our framework (top part of Fig. 1), we take a processual perspective for identifying governance processes that enable voluntary business-government information sharing.

4. Method

In this section, we discuss our method, as well as the data collection and analysis. This study builds upon the interpretative, contextualist and processual tradition that is well-established in information systems and organisational research (Klein & Myers, 1999; Orlikowski & Baroudi, 1991; Pettigrew, 1990; Walsham, 1993). As discussed by Walsham (1993), such studies are "aimed at producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by the context" (Walsham, 1993, pp. 4–5). Accordingly, we searched for explanations of the voluntary information sharing of business data with government. In terms of the five theory types of Gregor (2006) this study is aimed at theorising that refers to (1) analysis and (2) explanation.

The focus of this study is the FloraHolland demonstrator which was part of the CORE EU-funded demonstration project (http://www.coreproject.eu/). The goal of the CORE project was to demonstrate how the data pipeline concept (Hesketh, 2010) can be used as a means for businesses to share data with authorities on a voluntary basis. In this paper, we focus on one of the demonstrator projects that was part of the CORE project, i.e. the "FloraHolland Air" demonstrator which focussed on a trade lane for importing flowers from Kenya to the Netherlands via airfreight. Data was collected in the period May 2014–April 2018. Data collection included participation in meetings, workshops (involving FloraHolland, Dutch customs and Dutch Plant Protection Agency (NVWA) and Delft University of Technology), interviews, and document analysis. Numerous phone calls and e-mail exchanges took place to clarify the inefficiencies in the current situation, opportunities for improvement, and benefits for businesses and authorities. Two visits to Kenya also took place. On the second visit, a delegation from the FloraHolland Air demonstrator project- including Dutch customs, The Dutch Plant Protection Agency (NVWA), as well as the university partner- visited the Kenyan counterpart authorities, and relevant business representatives to conduct research about the applicable export procedures out of Kenya.

For the data analysis, we utilised our *Framework for voluntary business-government information sharing* (see Fig. 1). The data analysis was performed during the lifespan of the FloraHolland demo in an iterative manner by focusing on different aspects from our conceptual framework. In the early stages, the analysis focussed on understanding the international trade context of the FloraHolland demo in terms of actors, systems, legislation, as well as the role and position of the digital trade infrastructure (data pipeline innovation) that was piloted. We analysed the import processes and trade documents related to imports from Kenya to the Netherlands, and we discovered logistic inefficiencies in the import procedure that could be solved by sharing more data from business, such as purchase orders, invoices, packing lists, with the inspection agencies. Next, we analysed the trade and transport documents from the companies in the supply chain that could help customs to improve their control and risk analysis of the flowers. Based on these analyses, the team designed a more efficient import procedure, called *Clearance-at-Landing*, by making use of voluntary business-government information sharing. This efficiency gain allowed to demonstrate reduced logistics delays and costs for business, thus providing a strong incentive for businesses to share additional information with the government border control agencies and to make investments to connect to the data pipeline solution of FloraHolland.

5. Introduction to the case study domain

In this section, we provide introduction to the international trade domain, the role of customs, as well as the FloraHolland case study.

5.1. International trade and the role of customs

We conducted our study in the context of the international trade domain where customs and other authorities at the border play a prominent role in controlling trade flows. Customs has various responsibilities, such as conducting controls to ensure safety and security related to the imported and exported goods, and ensuring proper collection of customs duties. In the operational processes, customs works closely with other agencies which have their own roles in controlling aspects of the international trade flows, such as the Plant Protection Agency which controls the flow of plants and ensures that plant diseases are detected on time and not spread further. In order to fulfil these tasks, customs and other relevant agencies need to introduce strict controls. But, at the same time, these controls add administrative burdens for trade that may lead to extra logistic delays and costs, which have a negative impact on economic activities. Customs administrations are also responsible for facilitating legitimate trade and economic growth. With the Trade Facilitation Agreement of the World Trade Organisation, trade facilitation of legitimate trade has become an important objective of governments around the world (WTO, 2014).

5.2. Introduction to the FloraHolland case

The case study that we examine in this paper is related to the import

Table 1
Overview of government agencies and their information systems.

Kenya		The Netherlands	
Government agencies	*Information systems*	*Government agencies*	*Information systems*
Kenya Plant Protection Agency (KEPHIS)	ECS	Dutch Plant Protection Agency (NVWA)	CLIENT
Kenya Customs (KRA)	SYMBA	Dutch Customs	AGS

of flowers from Kenya to the Netherlands. The flower supply chain starts with the growers in Kenya growing flowers which are subsequently exported from Kenya to the Netherlands. On the Kenyan side, there are freight forwarding companies which arrange the transport of flowers to the airport and related export formalities with the authorities. The flowers are transported by an air carrier and arrive in the Netherlands at Schiphol Airport where a freight forwarder is responsible for the Dutch import formalities and transport. FloraHolland is a cooperative of growers which provides its members with auctioning, warehousing and coordination of logistics services. After arrival, the flowers are either transported to the FloraHolland's auction facilities or directly to the importer, if they have been sold beforehand. Two types of government agencies are involved on the Dutch and Kenyan sides, namely Customs and Plant Protection. Table 1 provides an overview of these agencies and the respective information systems that they use.

There are two important regulatory frameworks relating to the export of flowers from Kenya to the Netherlands: the *International Plant Protection Convention* (IPPC) which operates on a global level and sets the international rules for national Plant Protection agencies; and the *Union Customs Code* that is the legal framework for customs administrations in the European Union. On a global level, the World Customs Organisation is a key body for setting international standards and recommendations for national customs administrations.

6. Case analysis

We used our framework for voluntary business-government information sharing (see Fig. 1) to structure the case analysis. We first provided an analysis of the business-government information sharing context and the benefits that voluntary sharing can bring to government and trade. We then discussed (1) the factors, and (2) the governance processes that enabled this voluntary information sharing.

6.1. Clearance-at-landing and overview of benefits

Using our framework (see Fig. 1) in this section, we focus on articulating the benefits from the voluntary business-government information sharing in the FloraHolland case. In order to be able to do that, we need to explain the new procedure that was developed. In the FloraHolland case, a new procedure was developed, called *Clearance-at-Landing*, which critically depends on the voluntary information sharing of business data with the authorities via a data pipeline. Fig. 2 provides a simplified view of the FloraHolland's current procedure for importing flowers into the Netherlands, and Fig. 3 illustrates the new Clearance-at-Landing procedure.

When flowers are imported from Kenya to the Netherlands, there are three risk assessment processes carried by the Dutch authorities before the goods can be released for the European internal market. These three procedures are: (1) *customs entry risk assessment* which is related to safety and security risk assessment and is performed by customs; (2) *phytosanitary product safety risk assessment* which is performed by the National Plant Protection Agency (NVWA); (3) *customs import risk analysis* performed by customs. These three risk assessment procedures are represented with vertical arrows in Fig. 2, with the agency responsible for the specific procedure is indicated at the top of Fig. 2. These three procedures are currently executed sequentially. First, the security risk assessment is done based on an entry summary declaration (called ENS). As a result, the goods are either selected for inspection, or are allowed to proceed further (indicated with OK in Fig. 2). Subsequently, a phytosanitary risk assessments results in a random selection of goods for inspection. In the case of roses, 5% of the consignments may be randomly selected as a result of this procedure. If the goods do not require inspection, or after being given an OK status after inspection, a special code is issued (a so-called P2 code) which allows them to proceed to the third procedure. The third procedure is performed, again by customs, and is related to fiscal risk assessment and the correct payment of duties. In the current situation, this third procedure can only start when the goods are physically at the location mentioned on the import declaration. This is so that if the goods are selected for inspection, customs inspectors know where to find the goods and inspect them. During the customs import risk assessment process, customs may require additional information to cross validate the accuracy of the import declaration before deciding whether to release the goods or select them for inspection. This request for additional information from importers brings additional delays as businesses are asked to submit additional documents that need to be identified and submited, which takes time and causes delays. Import duty is calculated as a percentage of the value of these goods. Therefore, it is essential for customs to know the precise value of the imported roses. Often, customs will ask the logistics party for additional information to verify the description of the goods as well as the buyer and seller of the goods; examples of relevant additional data are the invoices, phytosanitary certificates, etc. The phytosanitary certificate is relevant, as it gives a very accurate description of the type of roses, information that customs can use to make a good estimate of the value of the goods, hence, cross-validation can be made against the value stated on the import declaration. While only a very small percentage of the goods of a shipment related to a customs declaration are actually selected for inspection, all the goods of this shipment have to wait until the import risk assessment process is completed before they can proceed further. This leads to unnecessary delays for goods that are not selected for inspection, which is typically 94% of the flow. In Fig. 2, the shaded area in the upper part of the figure indicates the procedures that are conducted while the plane is in the air. The lower part of Fig. 2 shows that the last procedure (risk assessment fiscal) is not performed when the plane is in the air, but at land when the goods are at the warehouse specified on the import declaration. The current situation reflects a sequential process, where one procedure needs to end before the next one can be started. The new procedure, Clearance-at-Landing, is illustrated in Fig. 3. The new procedure makes use of the possibilities offered by: (1) a data pipeline; (2) the new Union Customs Code that was introduced in 2016; (3) the introduction of the electronic declaration system ECS that was introduced by KEPHIS. ECS could be used by the grower, or its logistics service provider, to request an electronic phytosanitary certificate for a shipment of flowers, also called e-Phyto. In the new procedure, customs receives access to additional business information provided on voluntary basis (pro-forma invoice which is a business document, issued by the grower, that customs can use to cross-validate the goods description and the exporter on the import declaration), before the arrival of the plane. Next to that, customs can also receive access to the electronic phytosanitary certificate issued by the Kenyan Plant Protection Agency

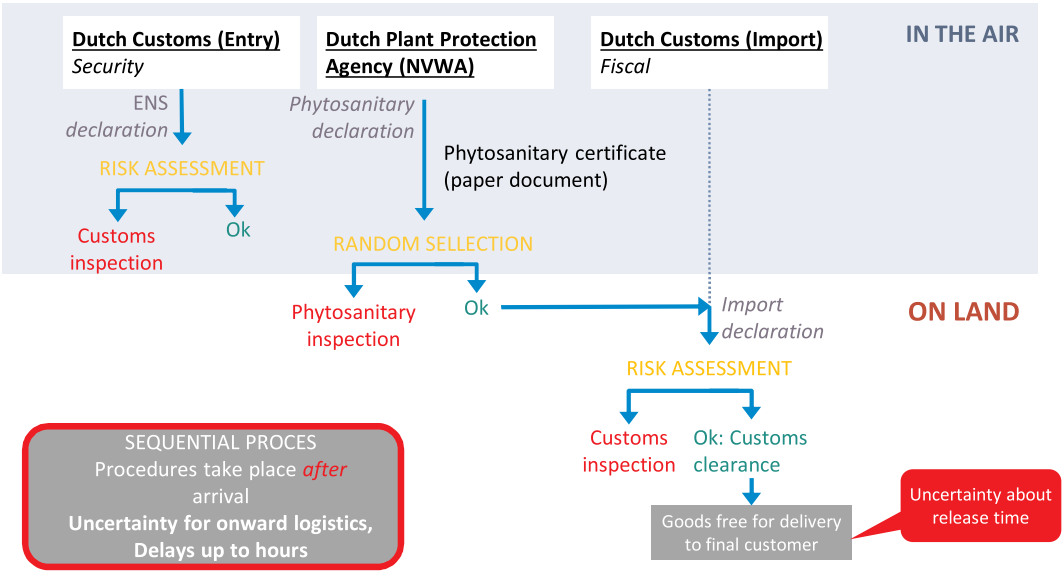

Fig. 2. Current procedure.

that provides additional information about the goods. This certificate can be made available to customs by the business parties via the data pipeline (a PDF version) or in an electronic version e-Phyto which can be sent via government data communication channels from the Plant Protection Agency in Kenya to the Plant Protection Agency in the Netherlands. This can then be shared directly with customs. The latter is an example of government-to-government data sharing, which is represented in the framework (Fig. 1). These two documents are represented with an arrow in Fig. 3 and listed under what is called "Optional multiple filing", which was the formal name of the option for companies to submit additional information to customs on a voluntary basis. In the new procedure, instead of a sequential process, a switch is made to a parallel process, where the three risk assessment processes are done almost in parallel and while the plane is in the air. In Fig. 3, this is indicated as a shaded area labelled "IN THE AIR". Compared to Fig. 2, in Fig. 3 we see that all the three procedures now take place while the plane is in the air. As a result, the goods that have not been selected for inspection (in this case 94% of the goods declared) can be transported to the customer immediately after the plane lands, without further delay. This is a significant improvement, as currently all goods need to wait for the results of the risk analysis upon landing, irrespective of whether they will be selected or not. This is indicated in Fig. 3 with the symbol pointing to the step *Goods free for delivery to the final customer*. For the goods that have been selected for inspection, businesses will be informed in advance, which will ensure better planning and a more efficient inspection process. Table 2 summarises the inefficiencies of the current procedure, the mechanisms used in the new procedure, and the benefits for business and government.

6.2. Factors influencing the voluntary information sharing

By using our framework (Fig. 1) as a next step in the analysis process we applied the factors, defined by Yang and Maxwell (2011), to analyse factors that influenced the voluntary information sharing in the FloraHolland case study. First, looking at the complete list of factors, we identified and selected those that were important in the context of our study. The original factors of Yang and Maxwell (2011) were grouped according to three perspectives, namely: *technological*;

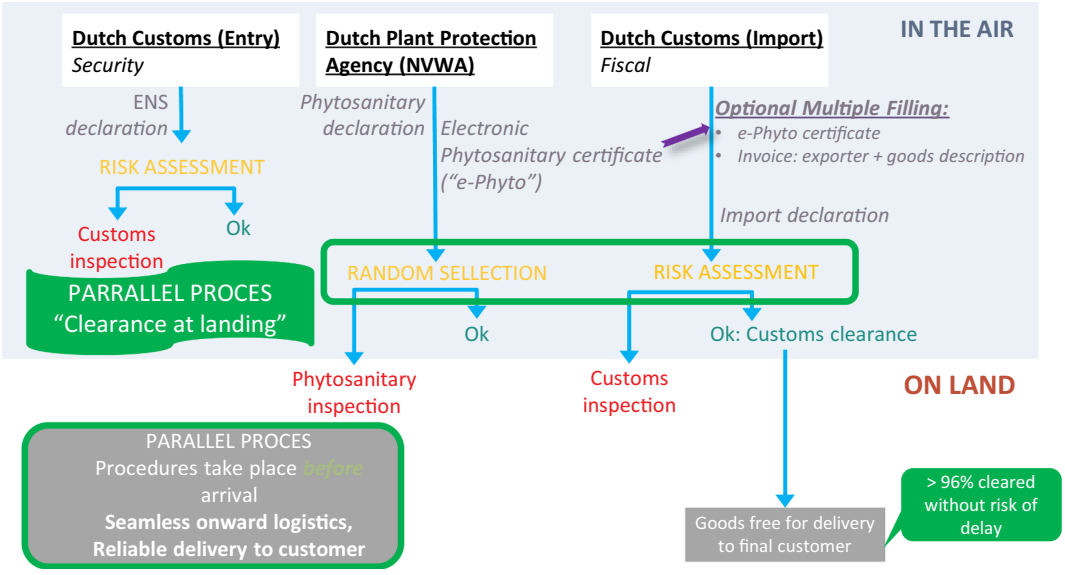

Fig. 3. Clearance-at-Landing.

Table 2
Identification of benefits for business and government in the Clearance-at-Landing procedure.

Inefficiencies in the current procedure	Mechanisms used to realise efficiency gains in the Clearance-at-Landing procedure	Benefits for business and government	Description
Time and effort taken to obtain additional business information required by customs to cross-validate customs declarations	Voluntary sharing of business information (pro-forma invoice and PDF of the phytosanitary certificate) via the data pipeline and/or ePhyto via the government-to-government (G2G) channels	Efficiency Effectiveness	**Government**: More accurate information and more efficient risk analysis process; More effective use of customs resources **Business:** Time and costs saved in not having to provide additional information on ad-hoc basis
Paper documents issued by authorities and inefficiencies in exchanging paper documents via the business-to-business (B2B) channels	Data pipeline is used to exchange a PDF version of the phytosanitary certificate Government-to-government information sharing via ePhyto	Transparency Efficiency Transparency	**Government**: Information on the Phytosanitary certificate is available earlier and in an electronic pdf form **Government:** More efficient information exchange; Possibility for automated processing of ePhyto information
Sequential procedure, where the last risk assessment procedure is performed only after the plane has landed	Parallel Process Shifting some procedures earlier in time	Efficiency Effectiveness Trade facilitation Economic growth Security	**Government:** More efficient risk assessment process; more accurate information for risk analysis for safety and security, as well as fiscal purposes; more efficient planning of inspections (when goods selected); reducing administrative burden and providing trade facilitation which stimulates economic growth **Business:** Trade facilitation and efficiency gains for 94% of the goods, which have not been selected for inspection; efficient planning of logistics in case of inspections

o*rganisational and managerial;* and *political and policy*. While these perspectives are useful, we needed some further logical clustering to better understand voluntary business-government information sharing. In particular, the coming about of voluntary business-government information sharing in the FloraHolland case study was very much determined by barriers that had to be overcome, and drivers and enablers that made it possible to overcome these barriers. Therefore, we selected a subset of the factors from Yang and Maxwell (2011) and regrouped the factors that we identified as relevant for our case into three categories, namely: *barriers* (B); d*rivers* (D); and e*nablers* (E).

We will show in our analysis below how this regrouping enables a better analysis of what constrained or motivated the voluntary sharing and what factors acted as enablers to overcome the barriers. The resulting list is presented in Table 3.

6.2.1. *Barriers*

We identified several factors as barriers to voluntary business-government information sharing. The context in the FloraHolland case study was characterised by a high level of heterogeneity, ranging from technical heterogeneity of the various information systems of business and government actors (factor B1 in Table 3); heterogeneity from an organisational perspective reflected in different geographic areas spanning Kenya and the Netherlands (factor B2); heterogeneity of different operation procedures between customs and Plant Protection Agency (B3); and heterogeneity of legal frameworks of customs and Plant Protection Agency; e.g. WCO and IPPC regulation respectively (B4). All these heterogenities posed major barriers for achieving voluntary business-government information sharing. Overcoming these was a major undertaking which required commitments and investments. Strong drivers needed to be in place to initiate the process and mobilise action.

6.2.2. *Drivers*

In the FloraHolland case study, we identified a list of factors which served as drivers for parties to engage in voluntary sharing. The two major drivers that motivated Dutch Customs to engage in voluntary business government information sharing projects are factors such as public scrutiny and performance evaluation (factor D2), and concerns of the quality of information received (factor D1). From a political and policy perspective, one of the tasks of customs is to provide trade facilitation and to facilitate the economic activities in a country. A well-functioning and efficient customs administration is an important decisive factor for companies when selecting a country to import or export their goods through, hence would strengthen the competitive position of a country. Therefore various international public rankings, such as the Logistics Performance Index (LPI)[2] of the World bank, would provide a public global performance evaluation about how efficient all customs administrations around the world operate. For Dutch customs high scores on these international rankings such as the LPI is very important in strengthening the competitive position of the Netherlands in providing favourable conditions for international trade. A second key driver for Dutch customs was the quality of the information received (factor D1). As discussed earlier, the information received via the mandatory channels is not sufficient for Dutch customs to perform their customs risk analysis efficiently and effectively. Dutch customs' vision for customs supervision by using additional data via the data pipeline was a key driver for them to engage with and motivate FloraHolland to join the initiative. This brings us to the third important driver for voluntary business-government information sharing, namely incentives and rewards (factor D3). Typically, businesses are in an antagonistic relationship with government, therefore it is unlikely that they will initiate the process of voluntarilyy sharing their data with government agencies. In our case, it was Dutch customs which had a very clear

[2] See https://lpi.worldbank.org/

Table 3
FloraHolland CORE demonstrator case study: identified barriers. drivers, and enablers clustered by reference to factors from Yang and Maxwell (2011).

Barriers(B)	Drivers (D)	Enablers (E)
B1 Heterogeneous Hardware, Software, and Information Systems	D1 Concerns of the Quality of Information Received	E1 Leadership
B2 Different Geographic Areas	D2 Public Scrutiny and Performance Evaluation	E2 Negotiation and Commitment Development
B3 Different Operation Procedures, Control Mechanisms and Work Flows	D3 Incentives and Rewards	E2 Legislations and Policies
B4 Legislations and Policies		E1 Information Technology (IT) Capabilities

vision of how additional business data shared on a voluntary basis could be useful for customs innovation. Therefore, it was Dutch customs which took the first step in articulating high-level benefits and win-wins to make FloraHolland interested.

6.2.3. Enablers

Our case study revealed that several factors played an important role as enablers for the voluntary business-government information sharing. These relate to: leadership (factor E1 in Table 3); negotiation and commitment development (E2), IT capabilities (E3); as well as legislation and policies (E4). With regard to IT capabilities (E3), as discussed earlier, a key barrier for information sharing was the heterogeneity within the information systems of business and government actors. Developing capabilities to link all these systems from scratch would have been very challenging, requiring significant resources and costs. In the FloraHolland case study, we identified that many of the information system capabilities necessary for realising the Clearance-at-Landing scenario, have already been developed in past projects. For example, many years before the FloraHolland project started, NVWA supported KEPHIS with the development of their ECS declaration system. And, for almost a decade, NVWA and Dutch customs have collaborated to align the CLIENT declaration system of NVWA with the Dutch customs' import declaration system (AGS). In the FloraHolland case study, these capabilities were brought together thus, only the remaining missing capabilities had to be developed. Due to these earlier efforts, it was easier to overcome the fragmentation in existing information systems, compared to a situation in which all systems would have had to be developed from scratch. On the policy side, legislation and policy (factor E4) played a very important role. We explained above that the Clearance-at-Landing procedure was legally only possible under the new Union Customs Code.

On the organisational side, leadership (E1) and negotiation and commitment development (E2) were key factors in the ForaHolland case study; and we would argue that these were the most important enabling factors. These factors are highly inter-twined and in our analysis we treat them closely together. What we observed in our case study, is that the factor *negotiation and commitment development* was important at every step of the process when engaging and committing new parties. However, we see this factor as an instrument for exercising *leadership*. In our analysis we therefore treat the factor *leadership* as the main enabler and the factor *negotiation and commitment development* as a factor that is associated with but subordinate to the factor *leadership*. In the next section, we examine the governance processes that took place. These governance processes are closely linked to the factor *leadership* and will allow us to shed light into the dynamic processes that took place, as well as the role of leadership in these processes.

6.3. Governance processes

In this section we discuss our findings related to the governance processes that we observed in the case study. We captured the governance processes through the concepts of alignments, alignment choreographies, and leadership; these are elaborated and explained below. In this paper, *alignment* refers to a process which concerns two parties, in which one of the parties takes leadership and engages in negotiation and commitment development in order to attract the other party to join. Our analysis showed that for realising the Clearance-at-Landing scenario, four types of alignment processes had to take place (see Table 4).

These alignment processes, however, did not occur randomly. There was a very clear logic of sequences in which the alignments occurred, with specific parties in the lead for initiating and driving these alignment processes. We will refer to this sequence of alignments as *choreographies of alignments*. Fig. 4 provides an overview of the choreographies of alignments and how they progressed through the different stages to bring about the voluntary business-government information sharing. Governance, in this context, can be observed at different levels, either by looking at governance of a specific alignment, or by looking at the choreographies of alignments. Leadership, which we identified as a key enabler in the factor analysis is closely related to the governance processes. In this context, leadership relates to the party (or parties) that execute the governance processes. As illustrated in Fig. 4, Dutch customs was the party that took the lead at the beginning of the process (Stage 1). It had the skills to articulate its own drivers in exploring the possibilities for voluntary business-government information sharing, it was able to articulate incentives for FloraHolland, to align the interests and to gain the commitment of FloraHolland to join the initiative (see Stage 1 in Fig. 4). Subsequently, in Stage 2, the process proceeded further. Now, Dutch customs was no longer leading the process alone. The leadership evolved into a joint leadership, with both Dutch customs and FloraHolland taking the lead. From this position, FloraHolland managed to align with its supply chain partners (see 2a in Fig. 4). It negotiated and gained their commitment to participate and share information on a voluntary basis with Dutch customs via a data pipeline. In parallel, Dutch customs used its leadership to align and secure the involvement of NWVA. Subsequently in Stage 3, NVWA also joined the leadership team together with FloraHolland and Dutch customs. These three parties worked closely together to: identify the legal basis for the Clearance-at-Landing procedure; identify what information systems capabilities were already in place from earlier initiatives; and what was needed to be developed in order to move forward. In this process, the pre-existing relationships of NVWA with its counterpart government agency in Kenya was essential. NVWA took the lead in this alignment and secured the commitment and involvement of KEPHIS. Finally, in Step 4, all the key parties were aligned and committed to make the voluntary information sharing possible. In the last phase, KEPHIS also became part of the joint leadership. Together all the parties ensured that the necessary resources were secured, and the information systems were aligned to make piloting with the Clearance-at-Landing procedure possible. When we look at Fig. 4 and reflect on the governance at the level of individual alignments, it was mainly one party that took the lead in a specific alignment process within the negotiation and commitment development in order to commit the counter party in the alignment to join. When we look at the governance of choreographies of alignments, we see that singular leadership transformed into a joint leadership, where the leading parties jointly negotiated and committed towards the common goal, and subsequently, each of the individual parties used its own leadership to mobilise the necessary resources and activities to make things happen.

Table 4
Alignment types.

Alignment type	Description
Alignment type 1- government-to-business (G2B) alignment	The alignment between Dutch customs and FloraHolland to jointly engage in voluntary business-government information sharing
Alignment type 2- business-to-business (B2B) alignment	The alignment of FloraHolland with the other supply chain partners, so that they agree to collaborate and to provide data via the data pipeline
Alignment type 3- government-to-government (G2G) alignment (national, inter-agency)	The alignment between Dutch customs and NWVA, including alignments in procedures and information systems
Alignment type 4- G2G alignment (international)	The alignment between NWVA and KEPHIS, including alignment in information systems for exchanging of electronic e-Phyto certificates

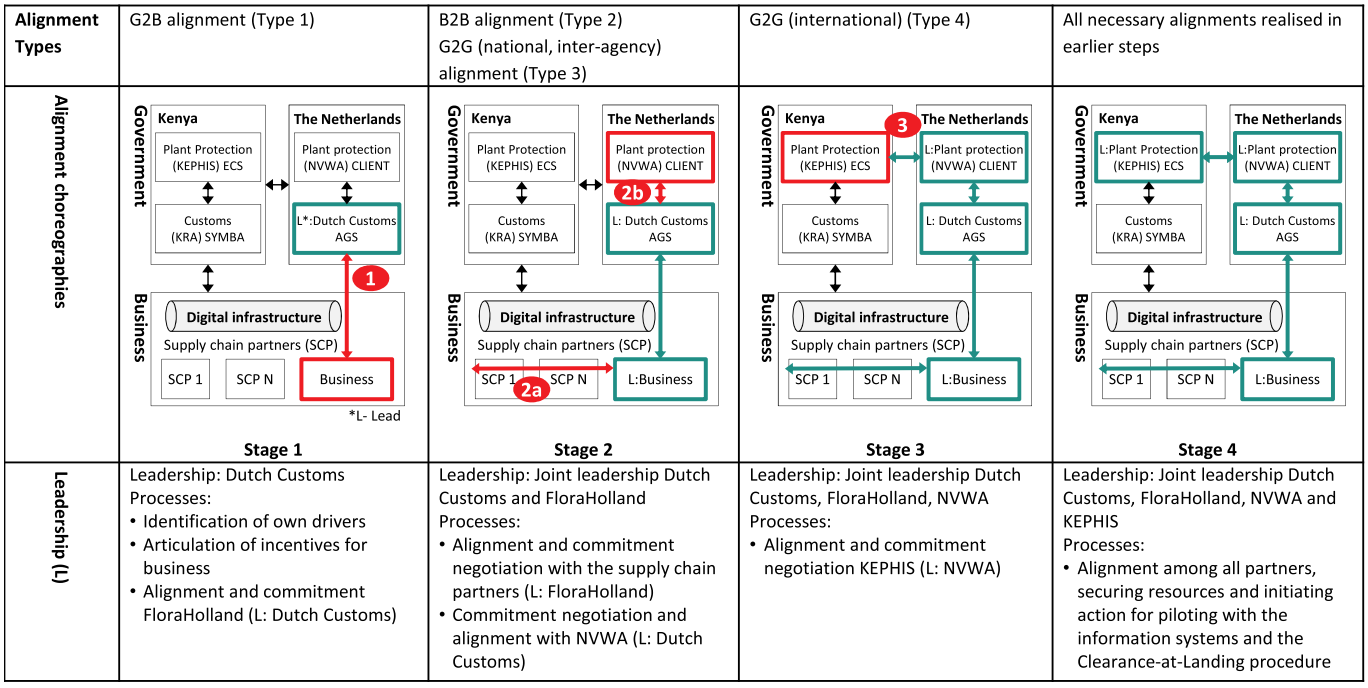

Fig. 4. Governance processes viewed as alignment types, alignment choreographies, and leadership.

7. Discussion

The main questions that we aimed to address in this paper were : *Can voluntary information sharing of business data with government bring benefits? What are the factors that influence voluntary information sharing? What are the governance processes for such information sharing to be achieved?* To address these questions, we first presented an initial framework for business-government information sharing and applied it to a case study from the international trade domain, the import of flowers from Kenya to the Netherlands. The framework turned out to be a useful tool in guiding the analysis. Our case study demonstrated that voluntary information sharing of business data with government can create benefits for both the business and the government organisations involved. Therefore the answer to the first question is affirmative. Achieving that, however, is not that straightforward.

The second question was: *what are the factors that influence voluntary information sharing?* By using the factors identified by Yang and Maxwell (2011) in the context of government information sharing and based on insights from the case study we identified that barriers for voluntary business-government information sharing occur due to: to heterogeneous hardware, software, and information systems; different geographical areas; different operating procedures, control mechanisms and work flows; as well as legislation and policies. These factors also point to barriers stemming from the context of voluntary sharing where there is heterogeneity in systems, procedure and legislation. Overcoming such barriers requires efforts and resources. Due to this heterogeneity, parties would only step in and make the efforts to overcome barriers if they have a strong driver to do so.

In our case analysis of the drivers, we identified a number of factors that motivated parties to engage in voluntary business-government information sharing. Key factors that played a role include: concerns of the quality of information received; public scrutiny and performance evaluation; as well as incentives and rewards. A lesson learned from the case study is that it is essential for there to be a government organisation with a clear view and vision as to why additional business data would bring benefits. Subsequently, this lead government organisation should have the skills to identify not only its own benefits, but also to elicit high-level incentives and rewards in order to commit a lead business organisation to join.

Our analysis of factors also identified several enabling factors that facilitate voluntary business-government information sharing; namely, the existence of information systems capabilities developed in earlier projects, as well as the possibilities offered by the new legislation. However, from the enabling factors identified, two factors appeared to be of great importance in achieving voluntary business-government information sharing, namely *leadership* and *negotiation and commitment development*. As discussed earlier, while these two factors are important in our analysis, we treat the factor *leadership* as the main factor with *negotiation and commitment development* as its sub-ordinate.

Regarding the third question, i.e.: *what are the governance processes for such information sharing to be achieved*, we studied the governance and alignment processes that took place. As Provan and Kenis (2008)

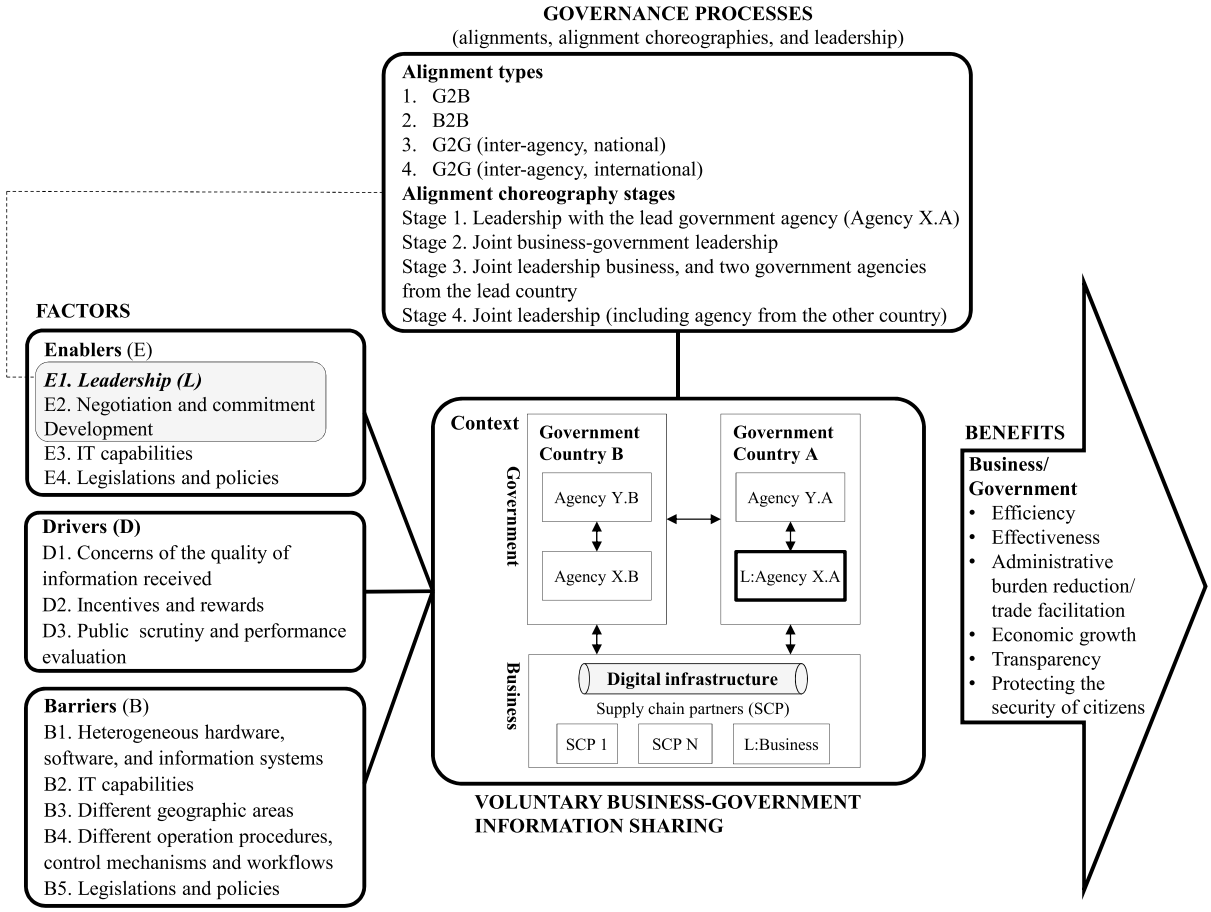

Fig. 5. (Revised) Framework for voluntary business-government information sharing.

argue, for goal-directed organisational networks, some form of governance is needed in order to ensure participants engage in collective and mutually supportive action, and that necessary resources are properly allocated and utilised. In our case study, the common goal was related to voluntary business-government information sharing. Based on our analysis, we identified four types of alignments and four alignment choreographies stages. Governance was needed at both levels of individual alignments and choreographies of alignments, as they progresses through different stages. These governance processes were driven by leadership and we identified key leadership parties in these processes. The whole process started with strong leadership of one lead government agency, and through the different alignments and choreographies of alignments, the commitment of other key parties was secured. Throughout the different stages, leadership shifted from a single organisation towards a joint leadership, which was extended to new parties as the process progressed. Only after these commitments and alignments were secured did it become possible for parties to overcome technical, procedural, and legal barriers and invest the necessary resources to work together towards the common goal, thus making voluntary business-government information sharing possible.

Based on our case study findings we enhanced our initial framework (Fig. 1) into the resulting framework which is presented in Fig. 5.

Our extensions and adaptations to the initial framework are as follows. First of all, we populated the factors part of the framework with a selection of factors from Yang and Maxwell (2011) which we identified as relevant for the analysis of voluntary business-government information sharing. We further regrouped these factors into (a) barriers, (b) drivers, and (c) enablers (left part of Fig. 5). Secondly, we further developed the part of our framework which relates to the governance and alignment processes to include the alignment types and the alignment choreographies that occurred at the different stages. Thirdly, we added an explicit link between leadership factors and governance processes. In Fig. 5, we marked the concept of leadership as bold to indicate it as the key enabling factor. In the context part of our revised framework (central part of Fig. 5), we also used the label (L) to identify the lead business and lead government organisation. The thick black shape around the Lead (L) agency indicates the party that initiated the process. Fig. 5 is also populated with benefits for business and government as identified in the case study.

7.1.1. Contribution to research

From a theoretical perspective, this paper contributes to the research on voluntary business-government information sharing (Gascó et al., 2018; Susha & Gil-Garcia, 2019). In this paper, we developed a novel *Framework for voluntary business-government information sharing* and applied it to the case of the import of flowers into the Netherlands, from Kenya. Our framework turned out to be a useful tool for analysis when applied to the case study and we further enhanced it based on case findings. Our framework builds upon and extends earlier research of factors for inter-organisational information sharing (Yang & Maxwell, 2011). In the earlier study, the factors were developed for inter-organisational information sharing within a government context. In our study, we showed that many of these factors were relevant for the analysis of voluntary business-government information sharing. We further extended this earlier research by providing additional clustering of the factors into barriers, drivers and enablers; these new categories appeared useful in our analysis. Finally, while a factor approach in isolation allows for a more static analysis, by adding a process

perspective, we also added a dynamic view and showed how the factors linked to the governance processes. This research also extends earlier research on digital trade infrastructures (Rukanova et al., 2018) by providing further insights into the governance dimension.

7.1.2. Policy recommendations

Our study shows that voluntary business-government information sharing can bring benefits to both business and government. Achieving such voluntary sharing is not simple. To initiate the process a strong government leadership is required to convince business parties to join. Therefore, government organisations have to develop skills to elicit how business data can bring benefits for their own organisation, but at the same time they need to be able to articulate benefits for businesses in order to involve them. Subsequently, it requires joint leadership and the gradual involvement of other business and government parties (nationally and internationally) that are instrumental to achieving their goals. In this process, overcoming barriers related to heterogeneity of information systems, procedures, and legal systems is a challenging task that requires a lot of resources. Part of the leadership process is to identify pre-existing relationships and information systems capabilities that have been developed in earlier projects, to make ultimate use of those pre-existing capabilities, and only develop those new capabilities that are still missing.

8. Conclusions

In this study, we developed a framework for voluntary business-government information sharing. This framework allows to capture the context of voluntary information sharing explicitly and to analyse the benefits that such sharing can bring to both businesses and government. Our framework suggests that the success of the voluntary sharing is influenced by factors (which we refer to as barriers, driver, or enablers), as well as governance processes. Leadership and commitment negotiation are key enabling factors that play a crucial role for achieving voluntary information sharing. Leadership also plays a crucial role in governance processes for governing individual alignments, as well as the complex choreographies of alignments to secure the commitment of key parties needed to make voluntary sharing happen. Government plays a key role in initiating this process. Achieving voluntary business-government information sharing can be further enabled by identifying and making ultimate use of existing information systems and legal capabilities, while only investing in developing the missing capabilities.

This study is limited to the domain of international trade and the case study of importing flowers from Kenya into the Netherlands that was part of the FloraHolland demonstration project conducted as part of the CORE project. Some of the alignments that we observed are still ongoing. The complexity of this domain allowed us to demonstrate the different alignment types that can take place in the context of voluntary business-government information sharing, including inter-agency alignments (nationally), as well as international alignments. Further research can proceed in a number of directions. First of all, the framework can be applied to other cases in the international domain. This would allow to further elaborate the framework and make it more widely applicable in this specific domain. Secondly, further research could apply the framework to other contexts of business-government information sharing with similar complexity requiring cross-border and cross-agency business-government alignments. Thirdly, further research can also test the applicability of the framework in more simple settings of voluntary business-government information sharing contexts to establish to what extend it is applicable to explain situations with more limited complexity in terms actors involved and the necessary alignments.

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