Does your role in a networked value constellation match your business strategy? - A conceptual model-based approach

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Abstract

Due to the worldwide connectivity provided by the Internet, organizations are now able to participate in dynamic *networked value constellations*; networks in which organizations *jointly* create value and satisfy customer needs. Participating in a networked value constellation does however increase the complexity of an organization's environment, making correct and deep understanding of the organization more complex. In this paper we utilize the business modeling techniques *e³value* and *e³forces* to (1) understand a *networked value constellation* and how a specific organization is *interwoven* in this constellation, (2) understand the *strategic position* of an organization surrounded by *environmental forces* and, (3) analyze if the *business strategy*, as chosen by an organization, is *consistent* with its position in the networked value constellation. An industrial strength case study was conducted in the Dutch aviation industry.

Keywords: *e³forces, e³value*, business strategy, networked value constellation

1 Introduction

The worldwide connectivity provided by the Internet has changed the way in which organizations do business. No longer are organizations bound to geographical regions; the entire world has become their playground. This worldwide platform has however changed the configurations in which organizations, and especially e-businesses, operate. Organizations are now able to cooperate and *jointly* create value in highly dynamic networks. Such networks are classified as *networked value constellations* (Tapscott, Ticoll, & Lowy, 2000). Although participating in a networked value constellation may aid in increasing profits, it also increases the complexity of correct and deep understanding an organization (Gordijn & Akkermans, 2003a). This is mainly due to increasing complexity of an organization's environment in which additional and more dynamic collaborations have arisen.

Recently, a number of approaches for conceptually modeling networked value constellations have been developed to analyze the business logic of a networked value constellation by following a (semi-)formal approach. Such business modeling techniques help to create in depth understanding of organizations because networked value constellations are *rigorously* defined and *conceptualized* such that clear and unambiguous graphical models can be made and semi-automatic analysis can be conducted. Furthermore, formally founded business modeling techniques contribute to a *shared understanding* of various features in a multi stakeholder setting (Borst, Akkermans, & Top, 1997). This is especially important if you consider that a networked value constellation is a multi-stakeholder setting by definition, consisting of enterprises with different terminologies and different frames for interpretations of how the constellation

actually works. A number of these business modeling techniques are worth mentioning: (1) BMO, developed by Osterwalder and Pigneur, with the purpose of expressing the business logic of firms (Osterwalder, 2004); (2) REA, developed by Geerts and McCarthy, which takes an accounting view on the economic relationship between various economic entities (Geerts & McCarthy, 1999); (3) *e³value* , developed by Gordijn and Akkermans, which considers value transfers between actors in the networked value constellation (Gordijn & Akkermans, 2001); 4) *e³forces* , developed by Pijpers and Gordijn, with the purpose of showing the strength of various external forces for understanding the strategic position of a networked value constellation within an industry (Pijpers & Gordijn, 2007).

The "business" these business modeling techniques try to capture is unavoidably connected to the business strategy of the organizations (Ceddon, Lewis, & Shanks, 2004; Gordijn, Yu, & Van Der Raadt, 2006). Some authors tend to consider (networked) business models and business strategies as equivalent (Ceddon et al., 2004), suggesting that a business model is able to capture *all* aspects related to business strategies. In this paper however we consider a business model to capture *only specific* aspects of an organization's business strategy (Ceddon et al., 2004). For instance the business modeling techniques REA, BMO and *e³value* do not really consider competition, whereas *e³forces* does not consider the internal business processes of an organization.

Typically, due to various reasons, a networked value constellation changes overtime; think of mergers, bankruptcies and acquisitions. These changes can lead to a new configuration of the networked value constellation; resulting in different roles, or positions, of the various actors within the networked value constellation. Therefore the *actual* configuration of, or position in, the networked value constellation might not be that as intended by a participating organization. However, for an organization's best interest it is important that its position within a networked business model is consistent with the business strategy of the organization (Porter, 1980; Johnson & Scholes, 2002).

To our best knowledge, currently there is no (semi-)formal way to determine if the position of an organization in a networked value constellation is consistent with the strategic position in an environment, which in turn is coherent with the business strategy of the organization. The contribution of this paper is a methodology, with clearly defined steps and utilizing semi-formal business modeling techniques, which will facilitate analysis of consistency between the value business model of an organization and its business strategy. We use the *e³value* modeling technique to represent *value* business models, denoting the value aspect of the organization's business strategy. In addition, we use the *e³forces* modeling technique to capture the *strategic positioning* of an organization in terms of environmental forces. To analyze the consistency between the value business model and the business strategy of organizations, participating in existing constellations, we use a bottom-up approach:

1. The first step is to model the networked value constellation, of which the organization under consideration is part, using the *e³value* business modeling technique. This step will allow us to analyze how the constellation creates value and how the organization is interwoven in the constellation.
2. The second step is to understand and analyze more "strategic" business features, for example competition. From the *e³value* business model we isolate an actor and determine the *strategic position* of this actor. This step allows us to understand the influence of environmental forces – coming from others participants in the constellation as well as coming from actors outside the constellation - on the organization at hand.
3. The final step is to analyze if the strategic position of the organization in the *e³forces* business model is consistent with the organization's business strategy. For this analysis we heavily rely on the work of Porter (Porter, 1980; Porter, 1985).

This paper is constructed as follows: first we will present two business modeling techniques - *e³value* and *e³forces* - as used for modeling the networked constellation. Subsequently, we introduce a case study to demonstrate the use of *e³value* and *e³forces* in an integrated way. Finally, we reflect on strategic analysis using *e³forces* and *e³value*, present conclusions and make suggestions for further research

2 Business Modeling Techniques

2.1 *e³value*

The *e³value* methodology provides modeling constructs for representing and analyzing a network of organizations, exchanging objects of economic value with each other. The methodology is well founded and has been expressed as UML classes. Furthermore, a graphical *e³value* editor and analysis tool is available for download (see http://www.e3value.com) (Gordijn & Akkermans, 2003b). Fig. 1 shows an educational example of an *e³value* model. Below we introduce the most important modeling constructs:

- *Actors* (often organizations or final customers) are perceived by their environment as economically independent entities, meaning that actors can take economic decisions on their own.
- *Value objects* are services, goods, or money, which are of economic value for at least one of the actors. Value objects are exchanged by actors.
- *Value ports* are used by actors to provide or request value objects to or from other actors.
- *Value interfaces*, owned by actors, group value ports and show economic reciprocity. Actors are only willing to offer objects to someone else, if they receive adequate compensation in return. Either all ports in a value interface each precisely exchange one value object, or none at all. So, in the example, Goods can only be obtained for Money and vice versa.
- *Value transfers* are used to connect two value ports with each other. It represents one or more potential trades of value objects.
- *Value transactions* group all value transfers that should happen, or none should happen at all. In most cases, value transactions can be derived from how value transfers connect ports in interfaces, but in particular cases ambiguity is possible. To resolve ambiguity, value transactions are needed.
- *Value activities* are performed by actors. These activities are assumed to yield profits.
- *Dependency paths* are used to reason about the number of value transfers as well as their economic values. A path consists of *consumer needs*, *connections*, *dependency elements* and *boundary elements*. A consumer need is satisfied by exchanging value objects (via one or more interfaces). A connection relates a consumer need to a value interface, or relates various value interfaces internally, of a same actor. A boundary element represents that we do not consider any more value transfers for the path. In the example, by following the path we can see that, to satisfy the need of the Shopper, the Manufacturer ultimately has to provide Goods.

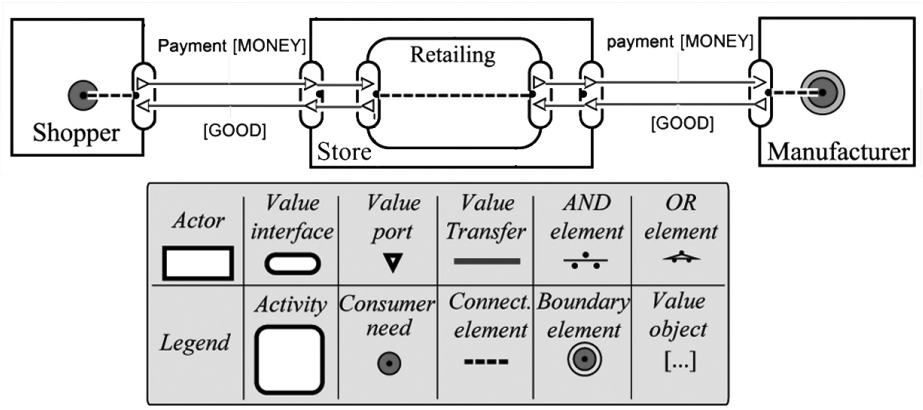

Figure 1: Educational example

2.2 *e³forces*

The *e³forces* modeling technique does not concentrate on value as *e³value* does; rather *e³forces* concentrates on the position of organizations in an environment with forces that influence that position. In an *e³forces* model, a constellation is explicitly stated and forces in the constellation's environment are connected, via value transfers, to the constellation. These forces are directly based on Porter's Five Forces framework (Porter, 1980; Porter, 1985). In addition, the strength of these forces is modeled to show to what extent the environment influences the constellation. Again we use the work of Porter to determine the strength of the forces. With the aid of a (graphical) overview of the forces and their strength it is possible to use semi-formal reasoning to qualitatively analyze and explain the configuration of the constellation (Pijpers & Gordijn, 2007). On the graphical and modeling side *e³forces* heavily relies on the *e³value* modeling technique, many concepts and constructs of *e³value* are incorporated in *e³forces* and used to reason about environmental forces. So, *e³forces* and *e³value* are well integrated techniques on a conceptual level. The concepts used in *e³forces* to present environmental forces are:

- *Constellation*. A constellation is a *coherent* set of two or more actors who cooperate to create value to their environment (Tapscott et al., 2000). As in *e³value*, actors are independent economic (and often also legal) entities (Mintzberg, 1979; Johnson & Scholes, 2002). For each of the actors in the constellation it holds that if the actor would seize its core business, then all other actors would not be able to execute a certain share (roughly 50% or more) of their core business or a certain share would no longer be valuable. The required share expresses the supposed coherence in the constellation. The actors are related using value transfers, cf. *e³value* (Gordijn & Akkermans, 2001, 2003b).
- *Market*. A constellation operates in an *environment* (Johnson & Scholes, 2002; Porter, 1980) consisting of *markets*. External organizations are grouped in a market because by considering sets of organizations, we abstract away from the individual and limited (Porter, 1980) influence on actors in the constellation of many single organizations. Therefore, the notion of "market" is motivated by the need to reduce modeling and analysis complexity. By doing so, we consider forces between *actors in the constellation* and specific *markets in the environment*, rather than the many forces between actors in the constellation and each individual actor in the environment.
- *Dominant Actor*. A market may contain dominant actors. Such actors have a power to influence the market and thus actors in the constellation. If a market is constructed out of a single large organization and a few small organizations, then it is the large organization who determines the strength of a market and is it less relevant to consider the small organizations. Usually dominant actors posses a considerable large share of the market.

- *Submarket*. It is possible to model submarkets of a market. A submarket is a market, but has a *special type* of value object that is offered or requested from the constellation. For instance, low cost carriers are a submarket of the carrier market. A submarket is shown in the interior of a market.
- *Force*. By exercising a *force*, markets in the environment of a constellation influence actors in the constellation. This is expressed by a "strength" arrow. Such an arrow is shown near an *e³value* value transfer. In the following sections, we illustrate specific forces, as derived from Porter's five forces model (Porter, 1980).

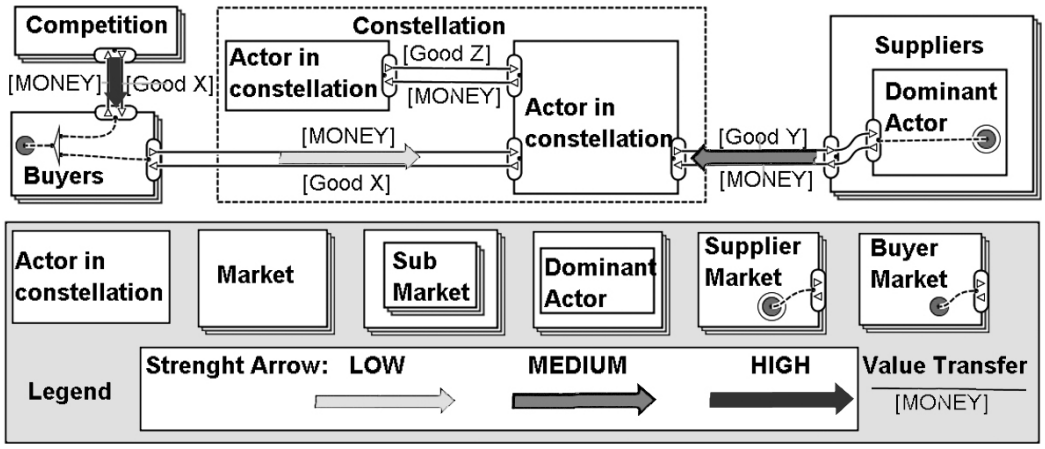

Figure 2: Educational example

3 Amsterdam Airport Schiphol

To demonstrate our methodology we provide an industrial strength case study conducted in the Dutch aviation industry. The core business of this networked value constellation is to provide air transport to, from and, via the Netherlands. In this networked value constellation many actors are present, but the most important actors are:

- *Amsterdam Airport Schiphol*, hereafter referred to as AAS, is the common name for NV Schiphol Group, who owns and is responsible for the operations of the actual airport Schiphol. AAS's core business is to provide infrastructural services, in the form of a physical airport and other necessary services, to various other actors who exploit the infrastructural services.
- *AirFrance-KLM* is a recent merger between AirFrance and KLM. Because one of the home bases of AirFrance-KLM is Amsterdam, they are part of the Dutch aviation constellation. AirFrance-KLM is responsible for the largest share of flights via AAS. The core business of AirFrance-KLM is to provide (hubbed) air transportation to customers such as passengers and freight transporters.
- *Air Traffic Control*, hereafter referred to as ATC, is responsible for guiding planes through Dutch airspace, which includes the landing and take-off of planes at AAS. This service is called Air Traffic Management and is the core business of ATC.

3.1 AAS's strategy

The goal of this paper is to determine if the position of AAS in the *e³value* business model is consistent with AAS's already known business strategy outlined in "Mainport Schiphol" (Schiphol Group, ATC The Netherlands, & KLM, 2005). AAS's strategy will be classified as one of four Porter's basic strategies (Porter, 1980, 1985).

The "Mainport" business strategy of AAS focuses on two core concepts (Schiphol Group et al., 2005). On one side AAS should be a international hub where many national,

European and intercontinental connections merge. Second, AAS is not solely an airport but a vast area with a high quality habitat, a desirable work environment and a good investment climate. The strategy states that AAS should grow from a "basic" airport to an "airport city". An airport city is an airport designed for hubbed air traffic, which offers more and better infrastructural services both for passengers as well as carriers. This type of strategy is considered to be "differentiation". AAS tries to differentiate from the competition by offering additional and better infrastructural services then its competition and does not strive for the lowest prices.

4 Consistency between business strategies and positions in networked value constellations

To analyze the consistency between value business models and business strategies of an organization three related steps have to be taken. First, by using the *e³value* business modeling technique, analyze how a networked value constellation *creates value* and how the organization under investigation is *interwoven* in the networked value constellation. Second, by means of the *e³forces* business modeling technique, understand the influence of *environmental forces* on the organization and determine the *strategic position* of the organization. Environmental forces are considered to be all actors with whom the organization has a direct or indirect relationship. Third, analyze if the *strategic position* of the organization within the networked value constellation is *consistent* with the organization's *business strategy*.

4.1 Step 1: An *e³value* business model for the Dutch aviation industry

The first step is to understand how the constellation creates value and what AAS's role is within the constellation. For this purpose an *e³value* business model for the constellation is created (see Fig. 3). Due to space considerations, we do not elaborate on the construction of the value model itself. For more information on creating an *e³value* model consult (Gordijn & Akkermans, 2001; Gordijn & Akkermans, 2003b).

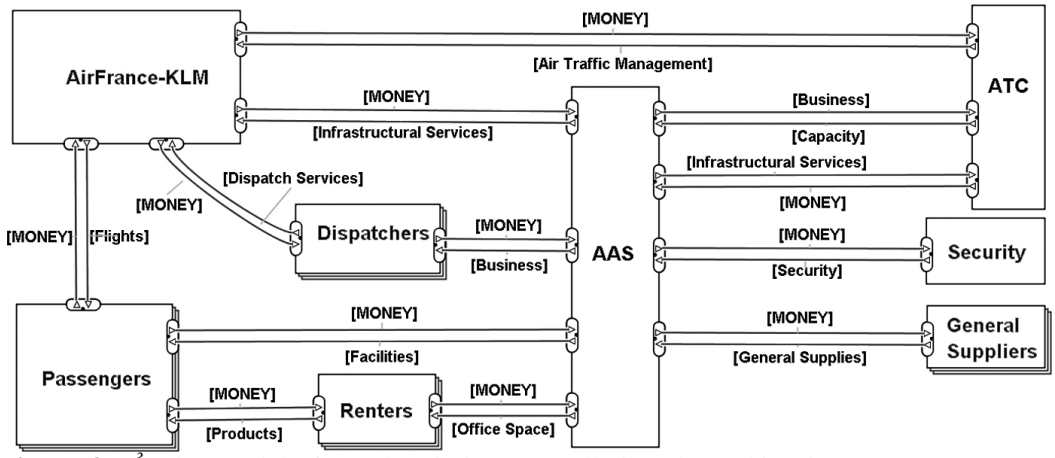

Figure 3: *e³value* model of Dutch aviation constellation (legend in Fig. 1)

Fig. 3 shows the *e³value* business model for the constellation consisting of AAS, KLM and ATC. The model has a slight focus on AAS due to space consideration. The model shows how AAS, KLM and ATC cooperate by exchanging value objects and how they create value for their environment (the other actors in the model). What the model however does not show is if these value transfers are consistent with the business strategy of AAS. For instance AirFrance-KLM is a recent merger between AirFrance and KLM, this has changed the networked value constellation. But it is not clear whether the effect

of this change within the networked value constellation affects the consistency between the value business model and AAS's business strategy.

4.2 Step 2: From *e³value* to *e³forces*

The second step is to migrate from the *e³value* business model to the *e³forces* business model. As stated earlier the *e³forces* modeling technique is originally intended to model the environment of a constellation instead of a single organization. Due to space limitations we only consider AAS, therefore the constellation in this *e³forces* model equals one organization: AAS. The following steps, starting from an *e³value* business model, result in an *e³forces* business model:

1. First we focus in on AAS and only consider economic relationships between AAS and other actors. To accomplish this, all value transfers in the *e³value* model which are not connected to AAS are removed.
2. Typically, the *e³forces* modeling technique does not consider the influence of individual actors, but considers the influence of groups of actors; markets. By considering markets (groups of organizations), *e³forces* abstracts away from individual and limited (Porter, 1980) influences of single organizations. Therefore individual actors in the *e³value* model are placed within their corresponding market. For example AirFrance-KLM is placed as a dominant actor in the "Carrier" market. There are however exceptions, as will be seen later.
3. Next, we identify *supplier* and *buyer* markets. Each actor which *acquires* a value object *from* AAS is given a consumer need, indication that this actor has a need for a value object offered by AAS and thus is a *buyer*. Each actor which provides a value object to AAS is given a boundary element, to indicate that this actor *provides* a value object which is needed by AAS and thus is a *supplier*.
4. Subsequently we extend the model with *competitors*. Competitors are conceptualized in the broadest sense; competitors are either existing competitors, potential entrants or substitutions. These three groups try to meet the same needs of buyers as AAS and try to increase their market share whilst reducing that of AAS (Porter, 1980). To incorporate competition we first model the competition market. The competition market is not *directly* connected to AAS, but *indirectly* via a buyer of AAS. This is because the competition market offers value objects to the buyers and not to AAS (Porter, 1980). Due to space purposes we only consider competition at the "Carriers" market.
5. The final step is to include the *strength* of the forces, for this we use the guidelines provided by Porter (Porter, 1980, Porter, 1985). The strength of the forces in expressed in the *e³forces* model by the *strength arrows*.

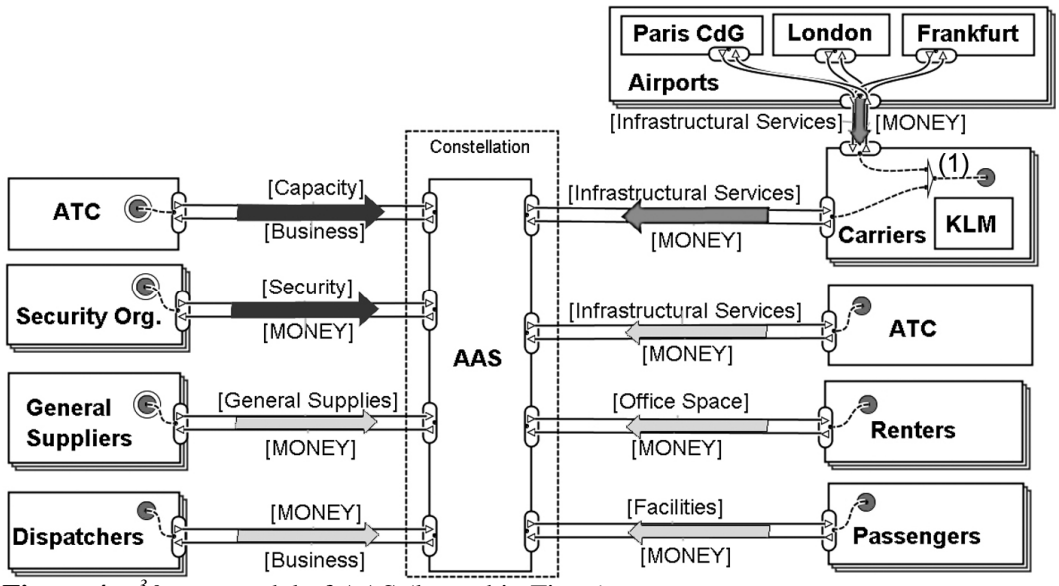

Figure 4: *e³forces* model of AAS (legend in Fig. 2)

From the *e³forces* business model (Fig. 4) can be seen which suppliers and buyers influence the business of AAS and to what extent (their strength). The position of AAS within these environmental forces is considered to be the strategic position (Porter, 1980). The model also shows two actors - ATC and Security Organizations - who are considered to be strong forces. These actors have a greater influence on AAS in comparison to the other actors. ATC is modeled as an actor not as a market, this is because they posses a monopoly position; there is simply no market, only this actor. Furthermore, in the competition market three dominant actors are present with who AAS is in competition. There are in reality more, but due to space reasons a selection was made.

4.3 Step 3: Analyzing the position of AAS

The third step should answer the following two questions: (1) Is AAS able to differentiate itself from the competition while being part of the existing business value constellation? (2) Does the strategic position of AAS aid in creating competitive advantage over the competition?

4.3.1 Question 1: Differentiation?

To analyze if AAS differentiates itself from the competition - London Heathrow, Paris Charles De Gaulle and Frankfurt - we compare these four actors on product price and product configuration as these are the factors on which organizations are able to differentiate themselves from competitors (Johnson & Scholes, 2002).

Product price. Table 1 shows the prices of the product offered by the various actors. The table shows that the prices do not differ much. AAS is even slightly cheaper than the competitors. This is consistent with AAS's "differentiate" strategy. Although this is not graphically visible in the *e³forces* model, it should be able to include an evaluation function in the model (at (1) in Fig. 4). This function could (semi)-automatically, instead of manually as is currently done, evaluate the price differences between the organization and its competitors. In addition, the evaluation function could determine to what extent the price difference is consistent with the organization's business strategy.

Airport	**Schiphol**	**Paris CdG**	**London Heat.**	**Frankfurt**
Airport fairs	447	291	400	405
Taxes	94	338	271	155

Total	541	630	371	560

Table 1: Prices Infrastructural Services

Product Configuration. Evaluating the product configurations is also performed manually and not visualized in the *e³forces* model, but the evaluation function discussed in the previous section could be extended to also evaluate the differences in product configuration.

Airports offer infrastructural services to the carrier market. This is an entire set of services and products offered. Carriers use the key indicators "year capacity" and "peak hour capacity" to compare airports (Adler & Berechman, 2001). Table 2 provides the numbers.

Airport	**Schiphol**	**Paris CdG**	**London Heat.**	**Frankfurt**
Year Capacity	403.000	516.000	470.000	463.000
Peak Hour capacity	104/408	105	87	78/82

Table 2: Key Indicators of Airports for Carriers

AAS's Mainport concept does however not solely consider the airport as an isolated structure; an airport is only one part of area where people live, work and recreate. Therefore AAS does not only need to compete on an "airport" level, but is must provide passengers and carriers with an environment in which people are willing to work and live. Although these factors are mainly relevant for passengers, these factors are also relevant to carriers; passengers are the customers of the carriers. People compare airports on the following key indicators (Furuichi & Koppelmans, 1994): convenience, comfort and accessibility (see Table 3. The first two are measured by the customer rating performed by SkyTrax (SkyTrax, 2005). The third key indicator is based on the access of the airport by car and public transportation.

Airport	**Schiphol**	**Paris CdG**	**London Heat.**	**Frankfurt**
Customer Rating	8^{th} place	> 10^{th} place	> 10^{th} place	> 10^{th} place
Accessibility	Good	Good	Medium	Good

Table 3: Key Indicators of Airports for Passengers

The purpose of this analysis was to determine if AAS is able to execute its "differentiation" strategy within the existing networked value constellation. The analysis supports this notion. AAS is able to differentiate itself from the competition by offering better service and access to customers, whilst remaining competitive on the capacity and price level.

4.3.2 Question 2: Correct strategic position?

In this section we analyze if the strategic position of AAS, as modeled in the *e³forces* business model, is consistent with the strategy of AAS. Again we look at the price and configuration of the product of AAS as offered to the carrier market (Porter, 1980; Johnson & Scholes, 2002). Again the evaluation is performed manually, but via (semi)-formal reasoning it should be possible to automatically perform the evaluation.

Product Price

- When analyzing the *supplier* markets it can be seen that ATC and Security Organizations" are *strong* forces. Therefore they can demand high prices for their product (Porter, 1985). There are however additional factors to consider. In Porters analysis of an organization's environment (the five forces) governmental institutions are neglected. Due to its monopoly position, ATC is, via governmental institutions, bound by various laws and regulations. Therefore only

"Security Organizations" has a negative impact on the product price of AAS. Financial data supports that security is one of the larger costs of AAS.

- When analyzing the *buyer* markets it can be seen that there are no strong forces and that there is only one *medium* strong force: "Carriers", with the dominant actor AirFrance-KLM. This implies that the "Carriers" market can influence the product price, but due to mutual dependency this influence is limited (Porter, 1985). Financial data supports that AAS is dependent on AirFrance-KLM; over 50% of the reveneus of AAS in the "Carriers" marker comes from AirFrance-KLM. However, large parts of AAS's profits originate in businesses other than provided to "Carriers". This implies that the "Carriers" market is not the most profitable market, which can be partly explained by its medium strength.
- The *competitive rivalry* on the "Carriers" market is *medium*. There are a number of dominant actors in the airport market, as seen in the model, with whom AAS has to compete for market share. Because there is medium competitive rivalry, there is some pressure on the profits margins, resulting in a need for growth by the competing organizations (Porter, 1980).

Based on the analysis above it can be concluded that the strategic position of AAS, in regard to the "Carrier" market, is consistent with its differentiation strategy. On the supply side there is only one organization who pressures the profits margins, since the second organization (ATC) is a non-profit organization. On the buyer and competition side it can be seen that the medium strength of the "carrier" market and the medium competitive rivalry place pressure on the profits. Although there is room to compete on the product price, competing on the product configuration, as chosen by AAS, seems to be supported by the strategic position of AAS in its environment.

Product Configuration. To analyze the strategic position of AAS in regard to its product configuration we look at how supplier, buyers and competition influence the key indicators (see Sec. 4.3.1) relevant for carriers and passengers.

- On the *supplier* side, AAS depends on ATC, "Security Organizations" and "General Suppliers" to provide products and services. The first two are strong forces, which results in a situation in where both suppliers have a large influence on the product offered by AAS, which is not desirable for AAS. This is however only true in regard to the key indicators relevant for carriers (see Sec. 4.3.1). For the key indicators relevant for passengers AAS is mainly dependent on itself and only partly dependent on "Security Organizations" and "General Suppliers".
- On the *buyer* side, AAS is influenced by the "Carriers" market; AAS has to tune its product to the needs of the carriers. Because carriers are a medium strength force, they have the power to demand and thus influence the configuration of the product as offered by AAS (Porter, 1980). This is however only true in regard to the key indicators relevant for carriers (see Sec. 4.3.1). For the key indicators relevant for passengers AAS is hardly influenced by passengers due to their weak strength, as seen in the *e³forces* model.
- The *competition* has influence on the key indicators relevant to carriers because when competitors increase their capacity AAS must follow to remain competitive. Increasing capacity is however a long and difficult track for all airports. The competition has little to no influence on the key indicators relevant for passengers, as provided by AAS.

Based on the analysis above, it can again be concluded that the strategic position of AAS, in regard to the "Carriers" market, is consistent with its differentiation strategy. Although, the *strong supplier* forces ATC and "Security Organizations" and the *medium buyer* force "Carriers" limit the possibility of AAS to differentiate on the key indicators relevant to carriers, AAS is hardly influenced by the forces in its environment to differentiate on the key indicators relevant to passengers. Therefore, the strategic position of AAS enables AAS to differentiate, on product configuration, from its competition.

5 Conclusion

In this paper we have proposed a model-based approach to (1) understand a *networked value constellation* and how an organization is *interwoven* in this constellation, (2) understand the *strategic position* of an organization within *environmental forces* in its environment and, (3) analyze if the *business strategy* as chosen by an organization is *consistent* with its role in the networked value constellation. For understanding the networked value constellation we have used the *e³value* business modeling technique and for understanding the strategic position we have used the *e³forces* modeling technique. The approach was tested on an industrial strength case study. The results showed that we were able, with the aid of the business modeling techniques *e³value* and *e³forces*, to determine if the role of an organization in the networked value constellation is consistent with the business strategy as chosen by the organization.

As noted several times in this paper, the evaluation steps performed in Sec. 4.3 were done manually. Using (semi)-formal reasoning, it should be possible to perform the evaluation (semi)-automatically. Further research is however needed and a software tool should be developed. Furthermore, we heavily relied on the business strategy literature developed by Porter. There are however other schools of business strategy (for example the "Resource-Based Theory" outlined by Barney (Barney, 1994)). It would be fruitful to see how these business strategy schools fit the applied model-based approach as proposed in this paper.

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