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ASSETS MANAGEMENT - A CONCEPTUAL MODEL DECOMPOSING VALUE FOR THE CUSTOMER AND A QUANTITATIVE MODEL

Abstract: In this paper we describe de application of a modeling framework, the so-called Conceptual Model Decomposing Value for the Customer (CMDVC), in a Footwear Industry case study, to ascertain the usefulness of this approach. The value networks were used to identify the participants, both tangible and intangible deliverables/endogenous and exogenous assets, and the analysis of their interactions as the indication for an adequate value proposition. The quantitative model of benefits and sacrifices, using the Fuzzy AHP method, enables the discussion of how the CMDVC can be applied and used in the enterprise environment and provided new relevant relations between perceived benefits (PBs).

Keywords: Value for the Customer, Assets management, Fuzzy AHP

1. Introduction

Under the global competitive pressure, many enterprises continuous seek ways to improve quality and innovative products/services contributing to the "improvement of the competitiveness, effectiveness, and flexibility of the company" (Nestic *et al.*, 2013) (p465). Studying how to build quality management, particularly Total Quality Management (TQM) evolving different critical success factors (CSF), which enterprise must accomplish to achieve the mission to be used in business key.

Many researchers have investigated the CSF of TQM implementation and some rely on several approaches, but research presented in this paper focus in one of the CSF, a centric

customer view – the so-called Value for the Customer (VC). We know that "customer are the only factor that can create competition among organizations", indeed "gaining competition has become a matter of knowing needs and wants" (Mojtahedzadeh and Arumugam, 2011) (p 21).

Value for the Customer is one of the most important factors of a success of an enterprise, so it is an indispensable tool to analyses how customers assess and perceived the actual product/service offer – the Value Proposition (VP). Paying attention to the desires, needs of the customer companies would increase a competitive advantage, as well as new innovations and on the quality of their products or services. But what is an innovative for one person could be the process of creating something new, or one can innovate to create value, not just in products or services to acquire some profit, but also in a qualitative manner (e.g

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trust, reliability, utility). The value proposition is the defining moment of any business, not the product or the service offered, but what customers perceive to be the service's value. As some authors said, "the value proposition defines the specific strategy to compete for new customers", (Jalili and Rezaie, 2010). It exist a current mismatch between a firm's value proposition and the customers' value perception. So it is essentially to determine which factors determine the perception on VC and how this value is perceived, involving what the customer receives (e.g. benefits) and what he gives up to acquire and use a product (e.g.: price, sacrifices).

Enterprises have a hard time defining value, measuring it, understanding how it is produced, delivered, and perceived by the customer. In this context, for any business enterprise to anticipate the value for the customer, it must understand how the "dynamics of value conversion" go "beyond the asset view of intangibles to understand the function of intangibles as negotiable goods and as deliverables." "(...) Value is therefore an emergent property of the network, so, understanding the functioning of the network as a whole is essential to understand how and why value is created. (...)" (Allee, 2008a)(p.12). According to the definition of TQM, it involves everyone in the organization and encompasses its every function. In this context, the value networks offers "a way to model, analyze, evaluate and improve the capabilities of a business", (Allee, 2008a) examining the business activities and processes for their capability to deliver value to the network. One must understand the dynamics of the value conversion of each deliverable/asset between each role, determining who is adding value and how business relates to its competitive environment. As participants in the network, people in the enterprise play roles and are responsible for using assets under their controls to create deliverables that can be traded into negotiable forms of value and to identify the benefits or sacrifices related to

each deliverable. This was the starting point of this research and led to a later focus on point of interaction between the enterprise and it's client/customer in understanding how tangible and intangible assets, either endogenous or exogenous to the company, contributed to the perception of value. The perception would be built upon the assessment of the set of deliverables comprising the actual product/service composing the enterprise offering.

The objective of our research is providing a modeling framework the Conceptual Model Decomposing Value for the Customer (CMDVC) and a quantitative model of benefits and sacrifices perceived by the customer that could enable suppliers to better understand how the customers perceive value, including how these relate to the combination of the forms of value for the customer and endogenous/exogenous tangible and intangible assets used by the company to provide the required deliverables to its customer. This model is validated through a case study in the context of a footwear industry.

2. Background concepts

The research presented in this study combines results from three distinct research areas: a) from the Marketing area, the concept of Value for the Customer (Woodall, 2003); b) from the collaborative networks area, the ARCON Reference Model for Collaborative Organizations Networks (Camarinha and Afasarmanesh, 2008); c) from the Intellectual Capital area, the concept of "Value Network", introduced by Allee (Allee, 2000b; Allee, 2000a; Allee, 2002b; Allee, 2002a; Allee, 2008a).

Value for the Customer

This research is centered in the following definition on Value for the Customer:

"Value for the Customer is any demand-side, personal perception of advantage arising out of a customer's association with an

organization's offering, and can occur as reduction in sacrifice; presence of benefit (perceived as either attributes or outcomes);the resultant of any weighed combination of sacrifice and benefit; or an aggregation, over time, of any or all these", (Woodall, 2003 p.2).

Value modelling encompasses different ways and perspectives of looking at benefits and sacrifices. Literature research can help to examine some of these views: 1) (Evans, 2002) refers to value as defined as the ratio of perceived benefit to perceived cost; 2) (Yusof, 2002) says that value is created when organizations provide goods and services to satisfy needs and desires of a customer. Value can also be seen as a "conception of what is ultimately good, proper or desirable in human life" or even an experience, (Boztepe, 2007). Perceived value leads to greater levels of customer loyalty, satisfaction and even to a greater success of organizations, (Snoj *et al.*, 2004). It can be understood as the utility of a product based on the perceptions of what is received and what is given, (Zeithaml, 1988a). According to (Snoj *et al.*,2004) perceived value presents a trade-off between benefits and sacrifices recognized by customers in a supplier's offering (Geoff Lancaster, 2000).

Enterprise members need to have a good understanding of how customers choose in order to manage their VP both initially and over time. To understand how customer perceived the value of an enterprise, Woodall (2003) divides the VC in four temporal positions:

- Pre-purchase - a phase of trying to predict how people perceive their services,
- At the point of trade – which implies a sense of VC experienced at the point of trade.; e.g. Acquisition Value plus Exchange Value,
- Post- Purchase - a phase that delivers results of experiments based on customers'/suppliers'

choices; e.g.: Use value; Received Value,
- After/use experience - a phase that reflects the point of disposal/sale.

Also, but related with the value temporal position, Woodall classified Value for the Customer into different forms of value,

- Net VC – "balance of benefits and sacrifices" to provide the best or the worst VC,
- Marketing VC – "perceived products attributes",
- Sale VC – primarily concerned with the price,
- Rational VC - "difference from the objective price",
- Derived VC – users' experiences.

In this context, Day and Moorman (2010) argue that:" an effective customer VP must communicate the value in a way that shows it has a deep appreciation of the customers value priorities" (Day and Moorman 2010, p 49). That´s why analyzing and studying VC is the master key to overcome the boundless challenges of this global competitive market. It could be an indispensable tool to create new customer loyalties in all kind of markets, expand global sales and improve the organization efficiency in a customer/client oriented way.

ARCON- Endogenous and Exogenous Components

To recognize potential customers and fulfill customer needs it becomes imperative to know the abilities of the company to fulfil the customer needs, paying attention to their endogenous and exogenous environmental characteristics.

In this context, we apply A Reference model for Collaborative Network Organizations – ARCON. This is a generic abstract representation for understanding the involved entities and relationships among entities. To understand and model the network both from inside are the endogenous elements that identify the mains set of elements and properties that can together

capture and represent organizations. For example, the number of their distinct and varied entities, concepts, functionality, rules and regulations. It is divided in four dimensions: Structural (s), Componential (c), Functional (f) and Behavioral (b) dimensions. To understand and model the network both from outside are exogenous elements, reveals the interaction with the surrounding environment. For example, the influence by the number of "interlocutors", customers, potential new partners. To better characterize these elements, it has four dimensions: Market (M), Support (S), Societal (S), and Constituency (C) dimensions, (Camarinha-Matos and Hamideh Afasarmanesh, 2008).

3. Applying the conceptual model Decomposing value for the customer in the footwear industry

3.1. Developing the Model Rationale - Conceptual Model Decomposing Value for the Customer

Understanding "what buyers value within a given offering, creating value for them, and then managing it over time have long been recognized as essential elements of every market-oriented firm's". Determining the benefits and the utility of a product or service, as well as to provide the means to explain how customers perceived the value of the exchanges (deliverables) of the product/service and how these are related to the enterprise endogenous and exogenous assets, helps a firm formulate a clear statement of its VP in contrast with its competitors. To this end, the model in Fig.1 was derived, which illustrates how to project the VC of each exchanged deliverable on to the following dimensions: 1) Forms of value

and Value temporal positions (Woodall, 2003); 2) Value Network – deliverables; tangible and intangible assets (Allee, 2000b; Allee, 2000a, Allee, 2002b; Allee, 2002a, Allee, 2008a); 3) Endogenous and Exogenous components (Camarinha-Matos and Afasarmanesh, 2008c; Camarinha-Matos and Afasarmanesh, 2008a); 4) Perceived benefits(PB)/Sacrifices (PS) (Lapierre, 2000; Lapierre, 2001; Woodall, 2003).

The model in Figure 1 allows the understanding how value for the customer can be broken down into component elements or simpler constituents integrating the value perceived by both suppliers and customer ($P1 \neq P3 \neq PE \neq P'$) at the point of transaction. The model also helps organizations to understand how and why value for the customer changes over time, from the pre-purchase until the end of the transaction. Some authors (De Toni and Tonchia, 2003) argue for a need to integrate the traditional "outside-in (which analyses the source of competitive analysis inside the firm)" and "inside-out (which analyses the source of competitive analysis inside the firm) " views of the firm into a competence theory. In this context, we apply the ARCON enterprise architecture (A Reference Model for Collaborative Organizations), identifying two perspectives: the enterprise life- cycle and the combination of the endogenous and exogenous components. The researchers know that the only part interested in this value exchanges is the customer. So it is important to understand these values in their forms of value and value temporal positions and what impact does each value have on the roles involved of the enterprise and in their environment characteristics (endogenous or exogenous). A case study in the context of a footwear industry is presented in order to validate and verify the rational of the relations on the CMDVC.
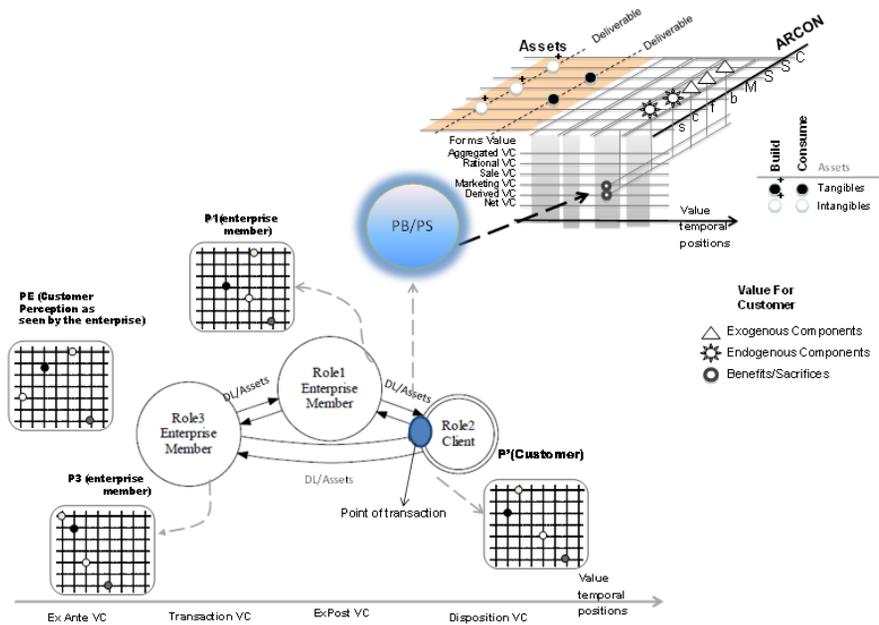
Figure 1. Conceptual Model Decomposing Value for the Customer

3.2. Case study

The case study was conducted in a footwear industry, that has been the largest contributor to the external accounts since it is the sector with the largest trade surplus, revealed the database in Portugal Banc, (November de 2012). The year of 2012 (November 2012) passed 1,3 thousand million euros in international sales (more than in 2011), the national industry gets ready for the new growth this year, with the strategy of the entrance in new markets such as United States, China and Chorea (Santos Pereira, 2013).The enterprise is a distribution company called Pontechem, with more than 20 years of experience, especially in the marketing of products for the customer segment of footwear industry and is therefore representative of an important group for the Portugal economy. In response to the customer needs they found obliged to look for new articles for other customer segment namely for the leather goods, decoration, clothing and accessories. Their key partnerships are the group XPTO in Portugal, consisting of companies producing synthetic fabrics for various applications with a great capacity for innovation and adaptation on the growing market demand. At this moment, they have also as a key partnership a representation of soles prefabricated, manufactures by the company XYZ.

3.3. Research methodology and data gathering

The design science (Dubé and Paré, 2003) approach was used to develop the proposed CMDVC framework. Three personal semi-structured recorded interviews of three enterprise members were conducted, the Pontechem CEO, which is also the owner and the responsible of the synthetic-fabrics leather and soles sales department, and the two persons responsible for the sales and operations planning (Fig.2). There was also one important meeting with the Pontechem CEO to position and clarify the research objectives and to provide a detailed explanation of the ongoing research. Right

after the interviews and after an in-depth analysis of the recorded interview, the researcher made a first version of the Pontechem Value Network (PVN), Fig.2, writing the names of the roles (actors), drawing the arrow lines exchanged between these roles and naming deliverables, both tangible and intangible.
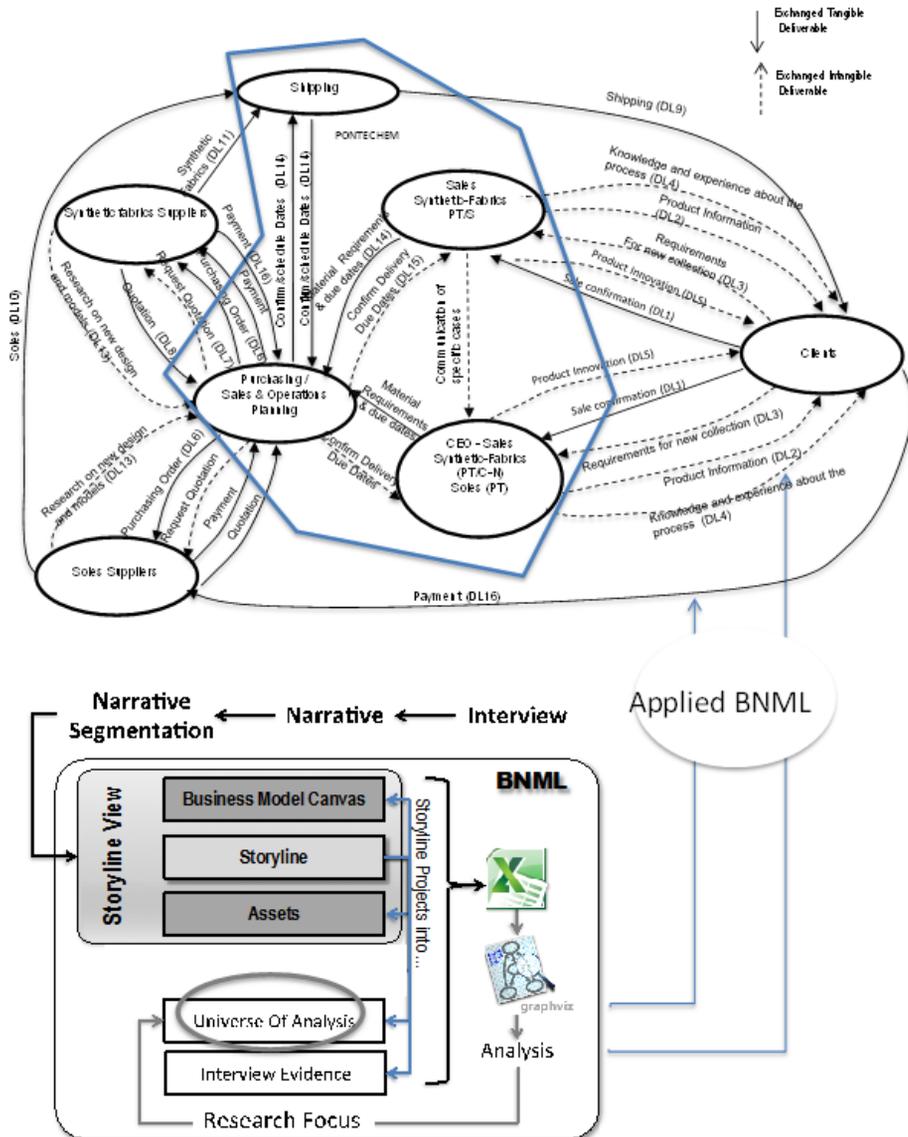

Figure 2. Using BNML to analyse and model each exchanged deliverable identified in the Pontechem Value Network

After that, the interviewees were asked to analyse the PVN and, together with the research team, improve it, giving us the possibility to identify each exchanged deliverables with their customer, as well as each used/built endogenous and exogenous assets. Following the interview gathered we use the so-called Business Narrative Modelling Language (Oliveira and Pinto Ferreira, 2011), to analyse and model each exchanged deliverables, according to a universe of analysis. The universe of analyses was composed by the Value temporal positions, forms of value, used/built tangible and intangible assets related with their endogenous and exogenous components. The interview segmentation into narrative patterns allows the construction of a Microsoft Excel table where each line establishes the relationship among the different coding scheme terms and the interview evidence that provides the rationale for those relationships. The Excel worksheet is then further processed using "pivot tables" in order to extract the desired perspectives onto the data model. This tool enables the visualization of graphs picturing the relationships among the keywords used in the coding scheme, at an Ex-Ante Phase (Pre-purchase phase).

4. Results from the enterprise perspective

4.1. Qualitative Discussion

On the first phase of the analysis of the case study, a graph (Figure 3) of the different type's form of Value for the Customer related to the exchange deliverables was built. Three forms of value emerged for this phase: Marketing (MARK_VC), Net (NET_VC) and Sale (SALE_VC) Value for the Customer. MARK_VC is the form of value related with most deliverables. Which seems most interesting since the customer perceived the product attributes in a form of expected value focused in a future orientation that becomes part of Product

Innovation (DL5). Also Mark_VC emerges as a desired value on the deliverable - Requirements for New Collections (DL3) by perceiving what is desirable for him. The organization's market positioning is perceived by the customer by giving them the Product Information (DL4).

In a second phase, the graph of Fig.3a) was extended by building the relationship between each deliverable, the asset being used or built and the projection of each asset into Arcon endogenous and exogenous components, as depicted in in Fig.3b). DL2 – Product Information is an example of how each deliverable and its value perception relates to the two components. DL2 is about providing the information about the Pontechem products/service: 1) of their certified products by [Using] Certified Products (A29); 2) the diversity of their product and revealing ideas to improve the products by [Using] Years of Experience (A11) and Know-how (A2), for building the knowledge need to help customer to achieve their goals. Pontechem wants to increase sales [Building] the assets A22 (Sales per Customer) and [Build] Percentage of Satisfaction among their customers.

"(…) we provide the information of our products, including the certification (A29), the assortment of product (A11) and the minimal accounts of the products. (…) Whenever there is a change in norms, our supplier must adjust to them. (…) the client requests the catalogues, with the characteristics of the product and we have to say if that is possible (A2). And these provide satisfaction on our customers as well it increases our sales."(Interview excerpts)

Asset A22 will be projected into: 1) Endogenous Functional (END_FUNC), reflecting on the competencies of their human resources, such as CEO and the personal of the enterprise as well as their product quality; 2) Exogenous Market (EXO_MARK) in acquiring potential sales and new customers. Asset A29 will be projected into Exogenous Support

(EXO_SUP), reflecting those entities that are entitled to issue certificates with establish regulations and norms.
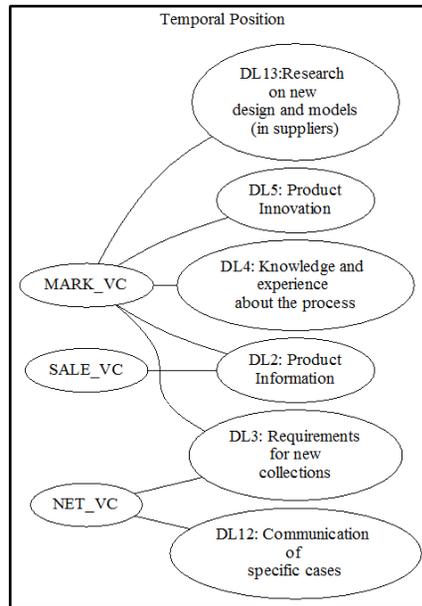
a) Temporal Position
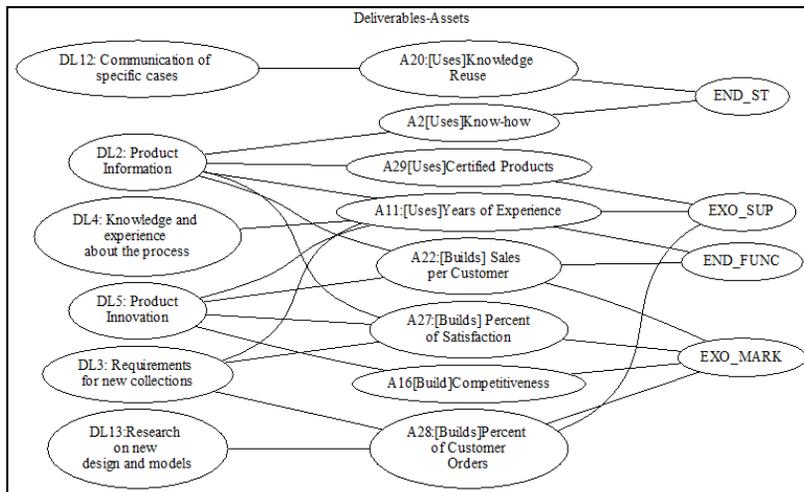
b) Deliverables – Assets - ARCON

Figure 3. Graphs of an Ex-Ante Phase

With this two graphs we were able to explain how can the VC be model and how could the value be built on top of assets endogenous and exogenous to the organization. In the next section we want to quantify the VC picturing how does enterprise members perceive the relative relevance of the assets

involved and how these assets relate to the perceived benefits and sacrifices.

4.2. Quantitative discussion - AHP Fuzzy extent analysis method

Table 1). Since one has to make the choice of appropriate alternatives (such as PB/PS) or criteria (assets/deliverables) in different

In the third phase, a detailed analysis of the Perceived Benefits (PBi) and Sacrifices (PSi) was conducted, related to the previously identified exchanged deliverables and enterprise assets at an EX-Ante time position (levels of hierarchy in an enterprise, in the next section the multi-criteria decision making (MCDM) techniques will be used to order such criteria.

Table 1. Perceived Benefits/Sacrifices

Deliverables	Assets Use/Build	Perceived Benefits/Sacrifices
DL2 – Product Information	A29[Uses] Certified Products (EXO_SUP)	PB21 Utility PB29 Financial Benefits
	A22[Builds] Sales per customer (END_FUNC)(EXO_MARK)	PB29 Product Quality PB47 Technical Competence PB49 Trust PS3 Monetary Costs PS22 Price
	A27 [Builds] Percent of Satisfaction (EXO_MARK)	PB2 Product Quality PB4 Service Quality PB46 Reliability PB43 Product Costumization PB17 Product Attributes
	A11 [Uses] Years of Experience (EXO_SUP)(END_FUNC)	PB49 Trust
	A2 [Uses] Know-how (END_ST)	PB49 Trust
DL3 – Requirements for new collections	A27 [Builds] Percent of Satisfaction (EXO_Mark)	PB2 Product Quality PB49 Service Quality PB46 Reliability PB43 Product Customization PB17 Product Attributes
	A28 [Builds] Percent of Customer Orders (EXO_MARK)(EXO_SUP)	PB21 Utility PB33 Convenience PB45 Flexibility
	A11 [Uses] Years of Experience (EXO_SUP)(END_FUNC)	PB47 Technical Competence PB49 Trust
	A2 [Uses] Know-how (END_ST)	PB47 Technical Competence PB49 Trust
DL4 – Knowledge and experience about the process	A11 [Uses] Years of Experience (EXO_SUP)(END_FUNC)	PB47 Technical Competence PB49 Trust
	A27 [Builds] Percent of Satisfaction (EXO_MARK)	PB2 Product Quality PB4 Service Quality PB46 Reliability PB43Product Customization PB17 Product Attributes
DL5 – Product Innovation	A22 [Builds] Sales per customer (END_FUNC)(EXO_MARK)	PB2 Product Quality PB47 Technical Competence

		PB49 Trust
		PS3 Monetary Costs
		PS2 Price
		PB47 Technical Competence
	A11 [Uses] Years of Experience (EXO_SUP)(EXO_MARK)	PB49 Trust
	A16 [Build] Competitiveness (EXO_MARK)	PB49 Logistic Benefits PB29 Financial Benefits
DL12 – Communication of cpecific cases	A20 [Uses] Knowledge Reuse (END_ST)	PB43 Product Customization
DL13 – Research on new design and models (suppliers)	A28 [Builds] Percent of Customer Orders (EXO_MARK)(EXO_SUP)	PB21 Utility PB29 Financial Benefits PB28 Strategic Benefits

One of the most common MCDM techniques is AHP (Ahmad *et al.*, 2006; Ahmad and Laplante, 2009; Peng *et al.*, 2011). The direct application of AHP cannot reflect the human thinking (Nukala and Gupta, 2005, Vahidnia *et al.*, 2008), so in this study AHP will be used together with fuzzy theory. The authors believe this approach is better in dealing with ambiguous and self-defined situations (Aggarwal and Singh, 2013). The

Fuzzy AHP method uses the Saaty's scale for each decision maker, individually carrying out each pair wise-comparison for the criteria/alternatives. Then, a comprehensive pair-wise comparison matrix is built, integrating the three perceptions of the two decision makers and customer (as seen by the company) through the equations (1-4) (Chen, 2005), transforming this values into triangular fuzzy numbers.

$$l_{je} = min(b_{jep}), \quad p = 1,2,\dots,t; \; j = 1,2,\dots,m; \; e = 1,2,\dots,m \tag{1}$$

$$m_{je} = \frac{\sum_{p=1}^{t}(b_{jep})}{p}, \quad p = 1,2,\dots,t; \; j = 1,2,\dots,m; \; e = 1,2,\dots,m \tag{2}$$

$$u_{je} = max(b_{jep}), \quad p = 1,2,\dots,t; \; j = 1,2,\dots,m; \; e = 1,2,\dots,m \tag{3}$$

$$\tilde{b}_{je} = max(l_{je}; m_{je}; u_{je}), \quad j = 1,2,\dots,m; \; e = 1,2,\dots,m \tag{4}$$

Then we apply the approach of Chang (Chang, 1996) for handling fuzzy AHP, by using the "extent analysis method" for the synthetic extent values, which derives crisp weights for fuzzy comparison matrix.

Consider a triangular fuzzy comparison matrix (eq-3) obtained by the steps of Chen (2005):

$$\widetilde{D}_p = \left(\tilde{b}_{ij}\right)_{n\times n} = \begin{bmatrix} \tilde{b}_{11} & \tilde{b}_{12} & \cdots & \tilde{b}_{1m} \\ \tilde{b}_{21} & \tilde{b}_{22} & \cdots & \tilde{b}_{2m} \\ \vdots & \vdots & \ddots & \vdots \\ \tilde{b}_{m1} & \tilde{b}_{m2} & \cdots & \tilde{b}_{mm} \end{bmatrix}$$

$$= \begin{bmatrix} (1,1,1) & (l_{12}, m_{12}, u_{12}) & \cdots & (l_{1n}, m_{1n}, u_{1n}) \\ (l_{12}, m_{12}, u_{12}) & (1,1,1) & \cdots & (l_{2n}, m_{2n}, u_{2n}) \\ \vdots & \vdots & \ddots & \vdots \\ (l_{n1}, m_{n1}, u_{n1}) & (l_{n2}, m_{n2}, u_{n2}) & \cdots & (1,1,1) \end{bmatrix}$$

To calculate a priority vector of the above triangular fuzzy comparison matrix $\widetilde{D}_p$, the steps of Chang's extent analysis can be given as in the following:

1) First, sum up each row of the fuzzy comparison matrix $\widetilde{D}_p$, by applying the fuzzy arithmetic operations:

$$\sum_{j=1}^{n} \tilde{b}_{ij} = \left(\sum_{j=1}^{n} l_{ij}, \sum_{j=1}^{n} m_{ij}, \sum_{j=1}^{n} u_{ij}\right), \; i,j = 1,2,\dots,n \quad (6)$$

Then the inverse of the vector (eq-6) above is:

$$\left[\sum_{j=1}^{n} \tilde{b}_{ij}\right]^{-1} = \left(1/\sum_{j=1}^{n} u_{ij}, 1/\sum_{j=1}^{n} m_{ij}, 1/\sum_{j=1}^{n} l_{ij}\right) \quad (7)$$

2) Second we normalize the rows sums (eq-7) by:

$$\tilde{S}_i = \sum_{j=1}^{n} \tilde{b}_{ij} \times \left[\sum_{j=1}^{n} \tilde{b}_{ij}\right]^{-1} \quad (8)$$

3) Third, compute the degree of possibility for $\tilde{S}_i \geq \tilde{S}_j$ of two TFNs $\tilde{S}_i = (l_i, m_i, u_i)$ and $\tilde{S}_j = (l_j, m_j, u_j)$ by the following equation (9):

$$V(S_i \geq S_j) = \begin{cases} 1, & if \; m_i \geq m_j \\ 0, & if \; l_j \geq u_i \\ \frac{l_j - u_i}{(m_i - u_i) - (m_j - l_j)}, & otherwise \end{cases} \quad (9)$$

a. In general, the priority weights are calculated by using the equation 109:

$$d'(A_i) = min \, V(S_i \geq S_k) \; k = 1,2,\dots,n; k \neq i \quad (10)$$

are the pair wise comparison of the $\tilde{S}$ TFNs.

b. Then the weight vector is given by the equation 11:

$$W' = \left(d'(A_1); d'(A_2); \dots; d'(A_n)\right)^T \quad (11)$$

c. Finally we normalized the weight vector (eq-12)

$$W = \left(d(A_1); d(A_2); \dots; d(A_n)\right)^T \quad (12)$$

where W is a non-fuzzy number.

By applying the fuzzy AHP method we obtain a matrix of overall results of the enterprise member perception of the relevant assets and the relevant PBi/PSi.

In this context, in order to evaluate the criteria and the alternatives, the interviewees of the enterprise were able to grade the pair-wise comparison by using the Saaty's scale giving: 1) the relative importance between each Criteria (Asset); 2) for each Criteria (Asset), the relative importance of each and every Alternative (PB/PS). The overall calculations by using the fuzzy AHP method are depicted in the table 2, showing: a) the relative relevance of the enterprise assets involved (colour grading column); b) the ranking of alternatives obtained for the Perceived Benefits (colour grading in the bottom row); c) the relationship between Assets and Benefits that were not identified during the interview; d) the deliverables identified with each asset (endogenous/exogenous); e) the form of value related with each deliverable. According to the pair-wise comparison of the company, and after the calculation by using the AHP Fuzzy Method, the higher value becomes the asset [Builds] Competitiveness (A16). This means, from [Building] Competitiveness Pontechem must focus on Product Innovation (DL5). In this case, the form of value perceived by DL5 is MARK_VC. The value is often manifested through product's composite attributes such as qualities or features that becomes for their products innovation (Tzeng, 2011). It is interesting to see that A16 has some high valued perceived benefits, namely Reliability (PB46), Product Quality (PB2) and Trust (PB49) that were not mentioned in the interview.

Table 2- Overall Results of Pontechem

Forms of Value	Deliverables	ARCON	Assets	PB2 Product Quality	PB4 Service Quality	PB17 Product Attributes	PB21 Utilit	PB26 Logistics Benefits	PB28 Strategic Benefits	PB29 Financial benefits	PB43 Product Customization	PB46 Reliability	PB47 Technical Competence	PB49 Trust	PS3 Monetary Costs	PS22 Price	Weight Priority vector of the Assets
SALE_VC	DL2 Product Information	END_ST	A02 [Uses]Know-how	0,1038	0,0554	0,0486	0,0884	0,0217	0,0407	0,0976	0,0473	0,1388	0,0956	0,0935	0,0663	0,1023	0,1498
MARK_VC	DL4-Knowledge and experience about the process; DL5 Product Innovation; DL3 Requirements for new collections	END_FUNC EXO_SUP	A11 – [Uses] Years of experience	0,1007	0,1271	0	0,1116	0,0016	0	0,1229	0	0,1821	0	0,1637	0,0413	0,1489	0,1904
SALE_VC; MARK_VC	DL2 Product Information;DL5 Product Innovation	END_FUNC EXO_MARK	A22[Builds] Sales per Customer	0,1487	0,1095	0	0,1447	0	0	0,1101	0,0307	0,1115	0	0,1068	0,0702	0,1679	0,1093
NET_VC	DL12 Comunication of specific cases	END_ST	A20[Uses] Knowledge Reuse	0,1089	0,0534	0,0455	0,0939	0,0141	0,0366	0,1018	0,0312	0,1483	0,0995	0,0933	0,0659	0,1076	0
MARK_VC; SALE_VC	DL5 Product Innovation;DL3 Requirements for new collections;DL2 Product Information	EXO_MARK	A27[Builds]Percent of Satisfaction	0,1576	0,1151	0	0,108	0,0465	0	0,1003	0,0481	0,1283	0	0,0971	0,0457	0,1534	0,1608
MARK_VC	DL13 Research on new sdesign and models; DL3 Requirements for new collections	EXO_SUP	A28[Builds]Percent of Customer Orders	0,1363	0,1111	0,0104	0,149	0,0164	0,007	0,1058	0,0496	0,1062	0,0109	0,0883	0,0645	0,1444	0
SALE_VC	DL2 Product Information	EXO_SUP	A29 [Uses]Certified Products	0,251	0	0,2239	0	0	0,0206	0	0	0,2224	0,0914	0	0,0256	0,1652	0
MARK_VC	DL5 Product Innovation	EXO_MARK	A16 [Build]Compe	0,1317	0,1395	0,0303	0,0518	0,0445	0	0	0,108	0,1586	0,0014	0,1261	0,0299	0,1782	0,3897
			Weight Priority vector of the PB/PS	0,127641	0,117338	0,019088	0,08786	0,028374	0,006097	0,066183	0,060263	0,150088	0,014866	0,121603	0,044469	0,156138	

This means that if an enterprise wish to remain competitive must be aware to their reliability level (Theotokas, 1999), as well as to their product quality and trust. This perceived benefits are related with Exogenous Market (EXO_MARK), which means the enterprise must focus on partnerships to achieve its goals, "showing the best potential value within their chosen marketplace" (Woodall, 2003). The interview testimonials confirm the rational for those relationships:

"(...) Our advantage is the diversification of our products, service and innovation. (...)There is an amount of different and innovated products each year in each collection. A customer can come and get everything to make shoes." (Interview excerpts)

The perceived benefits with higher values on using the asset [Uses] Years of experience (A11- ranked in second), were Reliability (PB46) and Trust (PB49). The customer perceived "the ability of the supplier to do things right at the first time" (reliability) and to honour his promises capturing the customer confidence that the supplier is telling the truth about the products (trust).

For the ranked alternatives, the highest priority vector of the PB/PS was PS22 – Price. Thus, it is the most important alternative that the enterprise may take into account in the decision making process, followed by PB46-Reliability, PB2–Product quality and PB4–Service quality. These results were confirmed by the enterprise and emphasized by some authors, whose words can be summarize as: "price is always a part of the customer's value calculation (…) and is one of the elements which is given up to obtain a product or a service" (Woodall, 2003; Zeithaml, 1988b). PB46-Reliability is ranked second and is defined "as the ability of the supplier's to keep his promises and the accuracy of the transactions" (Lapierre, 2001). In this context, [Using] Years of experience (A11), Certified Products (A29)

and Knowledge Reuse (A20) are contributing for PB46-Reliability.

As an example, we can see in Table **2**, the assets that influence with higher value the perceived benefit "Service Quality" are [Uses] Years of experience (A11), [Builds] Competitiveness (A16), [Builds] Percent of Customers Orders (A28) (Colum 6). Also for the perceived benefit "Product Quality" are [Builds] Sales per Customer (A22), [Builds] Percent of Satisfaction (A27) (Colum 5).

The relationship between assets and benefits that were not identified during the interview are the cells in white background. It is interesting to see that A16 is a very important asset, although the PB associated with it has not the highest value in the whole set of PBs/PS. In this case, there were four perceived benefits that did not emerged during the interview, namely: PB46-Reliability; PB4-Service quality; PB2-Product quality; PB49-Trust. These relationships are explained by the Saaty's scale ranking of alternatives, thus leading to the analysis of previously disregarded relationships.

5. Conclusions

This paper applies an EX-Ante phase, the Conceptual Model Decomposing Value for the Customer, and a quantitative model of benefits and sacrifices, perceived into their forms of value for the customer, and how these related to the combination of endogenous and exogenous tangible and intangible assets used by the company to provide the required deliverables to its customer, in the footwear industry. It was confirmed the role of endogenous and exogenous assets and their relationship with each exchanged deliverable and their forms of value. It is clear that endogenous and exogenous assets influence the Value for the Customer, emerging from the relations made explicit between the assets in Fig. 3b) and the ARCON dimensions intersected with the results of table 2, which map the relative

value of each asset as the result of weighting perceived benefits. These clearly emerge from the interviews at Pontechem. The CMDVC and the quantitative process revealed useful by providing the discovery of previously disregarded connections between assets used and/or built in the foreseen exchange of deliverables and perceived benefits.

As a final conclusion of this work, the authors highlighted the following comments from the enterprise:

"(…)If the customers feel dissatisfied with something, this model came to help clarify the points where we can focus on to reduce this dissatisfaction. We can work on service quality, reliability and without doubt in trust that appears with lower values because it is related to reliability.(…)" (enterprise interview excerpts)

6. Future research

The unfolding of this research shows that this is a useful exercise for this enterprise if they want to assess the value proposition of their offer and, moreover, if they want to understand the adequacy of their enterprise assets to support the desired value proposition. We would like to extend our research in two complementary directions:

- Integrate the perception of their customers/clients.
- Develop set of case studies to perform this study for different value temporal positions, namely at the point of the trade, in a post-purchase phase and after use experience.
- Apply other multicriteria decisions methods, namely fuzzy least squares method
- The development of a tool for Micro enterprises and SMEs, which would allow users in the enterprise to build a model of the value

perception combining both the internal perspective and the perspective of their customers/clients.

7. Limitations of the study

The research team tried to perform this study in the right way by following a correct methodological approach. However some limitations appeared at the time of conducting our research that should be acknowledge and addressed:

- The enterprise members may find it hard and subjective to assess the pair-wise comparisons required using the Saaty's scale. The problem was overcome by having interviews with the involved enterprise members. The interviews were conducted at different stages of the process, enabling the step-wise validation and consistency of the achieved intermediate and final results.
- The company offered some resistance in allowing the interview with the customer.

References:

Aggarwal, R., & Singh, S. (2013). AHP and Extent Fuzzy AHP Approach for Prioritization of Performance Measurement Attributes. *World Academy of Science, Engineering and Technology, 73*, 145 - 151.

Ahmad, N., & Laplante, P.A. (2009). Using the Analytical Hierarchy Process in Selecting Commercial Real-Time Operating Systems. *International Journal of Information Technology & Decision Making*, *8*, 151-168.

Ahmad, N., Berg, D., & Simons, G.R. (2006). The Integration of Analytical Hierarchy Process and Data Envelopment Analysis in a Multi-Criteria Decision- Making Problem. *International Journal of Information Technology & Decision Making*, *5*, 263-276.

Allee, V. (2000a). Reconfiguring the value network. *Journal of Business strategy*, *21*, 36-39.

Allee, V. (2000b). The value evolution: addressing larger implications of an intellectual capital and intangibles perspective. *Journal of intellectual capital, 1*, 17-32.

Allee, V. (2002a). A Value Network Approach for Modeling and Measuring Intangibles. *Presented at Transparent Enterprise, Madrid, November*.

Allee, V. (2002b). A value network approach for modeling and measuring intangibles. *Proceedings Transparent Enterprise, Madrid*.

Allee, V. (2008). Value network analysis and value conversion of tangible and intangible assets. *Journal Of Intellectual Capital*, *9*(1), 5-24. doi:10.1108/14691930810845777

Boztepe, S. (2007). User value*: Competing theories and models. *International Journal of Design*, *1*(2), 55-63.

Camarinha-Matos, L., & Afsarmanesh, H. (2008). ARCON reference models for collaborative networks. *Collaborative Networks: Reference Modeling.*

Camarinha-Matos, L., & Afsarmanesh, H. (2008a). Collaborative Networks: Reference Modeling. *Springer Science+Business Media, LCC.*

Camarinha-Matos, L., & Afsarmanesh, H. (2008c). ARCON Reference Models for Collaborative Networks. *Collaborative Networks: Reference Modeling, 83-112.*

Chang, D. (1996). Applications of the extent analysis method on fuzzy AHP. *European Journal Of Operational Research*, *95*(3), 649-655. doi:10.1016/0377-2217(95)00300-2

Chen, H.H. (2005). A research based on fuzzy AHP for multi-criteria supplier selection in supply chain. *Taiwan: National University of Science and Technology. Master's thesis*.

De Toni, A., & Tonchia, S. (2003). Strategic planning and firms' competencies: traditional approaches and new perspectives. *International Journal of Operations & Production Management, 23*, 947-976.

Dispositional Analysis. *Academy of Marketing Science Review*, *12*.

Nestic, S., Stefanovic, M., Djordjevic, M., Arsovski, S., Stojanovic, S. (2013). *An Assessment and Optimization of Quality of Strategy Process, 7th International Quality Conference, Kragujevac, Serbia*, 2013, 24 May, pp. 453-464, ISBN 978-86-86663-94-8

Dubé, L., & Paré, G. (2003). Rigor in information systems positivist case research: current practices, trends, and recommendations. *Mis Quarterly*, 597-636.

Evans, G. (2002). Measuring and managing customer value. *Work Study*, *51*(3), 134-139. doi:10.1108/00438020210424262

Geoff Lancaster, D.W. (2000). Implementing value strategy through the value chain. *Management Decision, 38*.

Jalili, M., & Rezaie, K. (2010). Quality principles deployment to achieve strategic results. *International Journal Of Business Excellence*, *3*(2), 226. doi:10.1504/ijbex.2010.030730

Lapierre, J. (2000). Customer-perceived value in industrial contexts. *Jnl Of Bus & Indus Marketing*, *15*(2/3), 122-145. doi:10.1108/08858620010316831

Lapierre, J. (2001). Development of measures to assess customer perceived value in a business-to-business context. *Advances in Business Marketing and Purchasing*, 243 - 286.

Mojtahedzadeh, R., & Arumugam, C.V. (2011). Determinants of TQM in the Iranian automotive industry: A theoretical approach. *International Journal for Quality Research, 5*, 21-32.

November de 2012. Análise Setorial da Indústria do Calçado.

Nukala, S. & Gupta, S.M. (2005). *A fuzzy AHP based approach for selecting potential recovery facilities in a closed-loop supply chain.* Proceedings of the SPIE International Conference on Environmentally Conscious Manufacturing V, Boston, Massachusetts, 58-63.

Oliveira, M.A.Y., & Pinto Ferreira, J.J. (2011). Facilitating qualitative research in business studies: Using the business narrative to model value creation. *African Journal of Business Management Decision, 5*, 68-75.

Peng, Y., Kou, G., Wang, G., Wu, W., & Shi, Y. (2011). Ensemble of software defect predictors: an AHP-based evaluation method. *International Journal of Information Technology & Decision Making, 10*, 187-206.

Santos Pereira, S. (2013). Exportações: Empresas de calçado antecipam subida das vendas em *Económico*.

Snoj, B., Pisnik Korda, A., & Mumel, D. (2004). *The relationships among perceived quality, perceived risk and perceived product value*. Emerald Group Publishing Limited.

Theotokas, I. N. Competitiveness through Reliability: A model for self-assessment of shipping. International Conference (DSI'99 Athens), 1999. 1210.

Tzeng, J. (2011). Perceived values and prospective users' acceptance of prospective technology: The case of a career eportfolio system. *Computers & Education*, *56*(1), 157-165. doi:10.1016/j.compedu.2010.08.010

Vahidnia, M., Alesheikh, A., Alimohammadi, A., & Bassiri, A. (2008). Fuzzy analytical hierarchy process in GIS application. *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, 37*, 593-596.

Woodall, T. (2003). Conceptualising Value for the Customer: an Attributional, Structural And

Yusof, S.W.M. (2002). Developing Strategy For Customer Value Creation Towards A Professional Services.*Consumer Perceptions of Price, Quality, and Value: A Means-End Model and Synthesis of Evidence,* 1988a. Article. Directed by ZEITHAML, V. A.: American Marketing Association.

Zeithaml, V. (1988b). Consumer Perceptions of Price, Quality, and Value: A Means-End Model and Synthesis of Evidence. *Journal Of Marketing*, *52*(3), 2. doi:10.2307/1251446

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