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Adoption Of Electronic Supply Chain Collaboration Services: The Effect Of Collaboration Climate And The Role Of Perceptions Of E-Marketplace Participation Impact

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ADOPTION OF ELECTRONIC SUPPLY CHAIN COLLABORATION SERVICES: THE EFFECT OF COLLABORATION CLIMATE AND THE ROLE OF PERCEPTIONS OF E-MARKETPLACE PARTICIPATION IMPACT

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Abstract

Based on the supply chain collaboration literature and electronic collaboration literature, this paper introduces the term 'electronic supply chain collaboration'. It further introduces and studies the role that an organization's collaboration climate plays in the perception of the impact of e-marketplace participation and adoption of electronic supply chain collaboration in parallel to external pressures. While the role of external pressures has been extensively studied in the pertinent literature, the role of company collaborative climate-culture has been rather ignored in this context, despite the fact that focus groups with experts within the framework of the presented research identified culture as a key determinant. A field survey is conducted with 81 respondents among users of electronic supply chain collaboration services through e-marketplaces in order to identify the effect of collaborative climate and the role of the perception of the impact of e-marketplace participation, using Institutional pressures as a "control variable" for the validity of this work. The first results indicate that the collaborative climate construct explains an organization's intention to adopt electronic collaboration linkages that require human intervention and collaboration. It is suggested that e-collaboration climate, based on culture theory, should be included in the research as a formative construct composed by internal collaboration, technology orientation, innovativeness and other cultural concepts. Further research is required in order to better understand these findings.

Keywords: *Electronic Supply Chain Collaboration, Interorganization Systems, Collaborative Climate, Perceived Impact*

1 INTRODUCTION

Since its origins, supply chain management has changed its focus from purchasing and logistics between the mid-1960s and 1990s to an updated focus on value creation since the mid-1990s and the new millennium (Kampsta et al. 2006). At about that time, an ongoing discussion emerged that supply chain management research should be built around the integration of trading partners (Barratt and Oliveira 2001), information sharing, benefits identification (McLaren 2003) and particularly, in the last decade, the development of innovative products and services utilizing both information technologies and collaboration among organizations (Patrakosol and Olson 2006). Collaboration as understood today has begun to take form since the mid-1990s, when the forms of collaboration multiplied (Pramatari 2006) and new forms of information sharing based on internet technologies extended their focus on the supply chain to include not only a passive exchange of information between partners, but also a more proactive approach through common planning and synchronization of activities and business processes (Skjoett-Larsen et al. 2003).

However, despite the initial enthusiasm, the spread of these services remains narrow and researchers partially attribute this to the difficulty and problems experienced with evaluating their performance (Klueber et al., 2001; Stockdale and Standing, 2004; Sramek et al., 2007). The pertinent literature mainly

focuses on performance evaluation (Subramaniam and Shaw, 2002; Min et al. 2005; Fu and Piplani, 2002; Auramo et al. 2005) while other aspects, such as culture, trust, information exchange and supply chain wide performance measures have been rather disregarded and deserve further research (Barrat, 2004). Kampstra et al. (2006) and Cadhilon et al. (2005), in particular, have both recognized the need to further study cultural aspects of organizations in the context of supply chain collaboration. This has been further reinforced by discussions and focus groups with experts.

The purpose of this paper is to study the effect that an organization's attitude and culture towards collaboration, named as e-collaboration climate play in the adoption of electronic supply chain collaboration services, as compared to other pressures, such as external pressures. For this purpose, institutional pressures theory (based on the model of Teo et al. (2003), studying the relationship between external pressures and the adoption of interorganizational linkages), is adopted and used rather as a "control variable" to add validity and relevance to this survey. Teo et al.'s constructs are expanded with a construct for collaboration climate items and a construct for the perception of the impact of e-marketplace participation in order to explain the intention to adopt collaborative services. A field survey was conducted among 81 user companies of electronic supply chain collaboration services, namely e-ordering and electronic procurement in order to test the research hypotheses.

In the following section, the pertinent literature on electronic supply chain collaboration and culture is discussed. Then the third section describes the research design, while the initial findings of this research are presented and discussed in the following two sections. The paper concludes with comments on the initial findings and directions for further research.

2 LITERATURE REVIEW

2.1 Electronic Supply Chain Collaboration

While the term 'electronic supply chain collaboration' is met in the literature as such, it is not clearly defined and in many cases other terms are used to describe similar or equivalent concepts (e.g. supply chain integration, interorganizational linkages, supply chain partnership or even interorganizational systems). The simpler term found in the literature is the quite generic "collaboration". According to Barratt (2004) "collaboration is a very broad and encompassing term and when it is put in the context of the supply chain it needs yet further investigation. It is an amorphous meta-concept that has been interpreted in many different ways". Collaboration is also defined as "Independent companies working together based on shared values and a common goal of doing business to jointly exploit a particular business opportunity" (Manthou et al. 2004). For the purpose of this research collaboration will be examined in the context of supply chain management, which is also currently extensively examined in the literature (Min et al. 2005) usually under the term of supply chain collaboration.

The differentiated perception of supply chain collaboration is evident from the variety of definitions given. Anthony defined it as "two or more companies share the responsibility of exchanging common planning, management, execution, and performance measurement information" (Anthony, 2000). For Akintoye et al. (2000) supply chain collaboration is applied in a context of "an organizational structure consisting of individual elements in the nature of a conglomerate, termed "the temporary multiple organization" (Akintoye et al., 2000). Simatupang and Sridharan (2005), add to their definition the purpose of collaboration, the sharing of benefits which is related to profitability, by defining it as "two or more chain members working together to create a competitive advantage through sharing information, making joint decisions, and sharing benefits which result from greater profitability of satisfying end customer needs than acting alone". The perception of collaboration changes when, instead of examining it within the context of supply chain management, it is examined in a more generic context. However, the interest of this research is on e-collaboration for supply chain management and defining it within this context is challenging, due to the different interpretations e-collaboration has under different contexts (Wang, 2005). Johnson and Whang define it as "business-to-business interactions facilitated by the Internet" (Johnson and Whang, 2002). Although short, quite inclusive and

could be extended if it is integrated with the purpose of e-collaboration to “facilitate coordination of various decisions and activities beyond transactions among the supply chain partners, both suppliers and customers” and the inclusion of the provided activities of “information sharing and integration, decision sharing, process sharing, and resource sharing (Johnson and Whang, 2002). This definition strongly correlates Business-to-Business (B2B) e-commerce to collaboration.

The separate use of the terms “Supply Chain Collaboration” and “e-collaboration” could be confusing and consequently the use of a specific term is essential. The term adopted is “electronic supply chain collaboration” as a synthesis of “supply chain collaboration” and “e-collaboration”. “Supply chain collaboration” is a broader area than “electronic supply chain collaboration” since it does not necessarily incorporate the “electronic” concept. On the other hand “e-collaboration” or “electronic collaboration” does not necessarily have to deal with supply chain management. A possible definition for the term could be: “two or more supply chain members working together to create a competitive advantage using internet-based information systems”. McLaren et al. (2002) classify supply chain collaboration information systems into three major types: a) message-based systems (such as the EDI), b) electronic procurement hubs, portals, or marketplaces and c) shared collaborative systems that include collaborative planning, forecasting and replenishment (CPFR) capabilities. Barratt categorizes collaboration on two axes, horizontal and vertical, external and internal collaboration and then depending on the partnership in five categories. External collaboration is divided into collaboration with other organizations, competitors, suppliers, customers. Using Barratt’s categorization, this research focuses on external and vertical electronic supply chain collaboration and using the categorization of McLaren et al. this research focuses on message-based systems and electronic procurement hubs.

The pertinent literature is “very extensive in both business and academia, but not always on target” (Kampsta et al., 2006) and consequently researchers support the need for further investigation of supply chain collaboration in several research areas. Subramaniam and Shaw (2002) state that it is necessary to achieve a better understanding of the value creation process of business-to-business supply chain processes. Specifically, “even as organizations are moving to Web-enable their B2B processes in the hope of improving their B2B supply chains and reaping economic benefits, there is a need to fully understand how this value is created and realized” (Subramaniam and Shaw, 2002). Likewise, Min et al. (2005) present the same opinion that “supply chain collaboration seems to have great potential, but further investigation is needed to understand its practical value”. Similarly, but referring to performance instead of value, Cassivi et al. (2004) believe that “some studies highlight the importance of collaborating across the entire supply chain, but very few have tried to assess the impact of collaboration tools on the performance of a supply chain from both supplier and customer perspectives”. Additionally, Fu and Piplani (2002) advocate that “evaluating the value of collaboration is necessary for developing the effective collaboration mechanisms”.

However, value and performance are not the only areas that the academic community considers as important in the context of supply chain collaboration. Indicative is the following reference to Barratt (2004): “many of the elements of collaboration, such as culture, trust, information exchange and supply chain wide performance measures have been, to a large extent, ignored due to their complexity and deserve significant attention individually in terms of further research”. Kampstra et al. (2006) also consider cultural aspects of collaboration as currently ignored, although, in contradiction to this opinion, trust has been examined by researchers (e.g. Paul and McDaniel, 2004, Grossman, 2004). Other areas of research are either directly or indirectly proposed by Wang and Archer (2004). Indirectly when noting that collaboration “requires comprehensive planning as decision-making, power, authority, resources” (Wang and Archer, 2004) and directly when mentioning as issues for further research – among others – the achievement of competitive advantage, trust, harmonization of member needs, adoption.

Although interorganizational systems are researched for more than two decades, the literature specifically on electronic supply chain collaboration is relatively new. Nevertheless, researchers manage to provide new conceptualizations of the phenomenon through differentiated views, thus building motivation for future research directions.

2.2 Culture in Electronic Supply Chain Collaboration and Information Systems Research

Some of the aforementioned references indicate that researchers tend to believe that culture has a certain importance for supply chain collaboration. Perhaps the most indicative point is that of Min et al. (2005), who even suggest that “collaboration should be defined as a firm’s culture of working together with other firms toward a common set of goals that bring mutual benefits to a partnering relationship”. Cadhilon et al. (2005) claim culture to be conducive to collaboration and a partnership approach to trading relationships and culture incompatibility (along with organizational structure and lack of strategic vision) to be the main reason for collaboration failure. The same viewpoint is shared by other researcher such as McIvor and McHugh (2000) who maintain that “organizations will have considerable difficulties in partnering with external entities if they cannot develop a partnering culture internally”. Williams et al. (2002) claim that “e-supply chain organizations will put less relative value on long-term partnerships and strategic alliances, when compared to traditional supply chain organizations, because of the “structure-culture fit” in the Internet-based e-supply chain”.

Although there are several more references to collaboration culture (Whipple and Russell, 2007; Skjoett-Larsen et al., 2003; 2006; Hoek et al., 2002) there are two publications that stand out, focusing on collaboration culture. The first comes from Barrat (2004) who defines four elements that form collaboration culture. These elements are: Trust, Mutuality, Information Exchange and Openness and Communication. The second one comes from Mello and Stank (2005) who base their work to more traditional views of organizational culture and propose a more generic framework which includes five shared values of culture. These values are: Trust, Commitment, Cooperative Norms, Organizational Compatibility and Top Management Support. Research, however, has only begun to explore cultural characteristics of Supply Chain management to better understand its development and implementation (Mello and Stank 2005).

Although the literature indicates that the role of culture is important, the cultural mindset that enables some companies to perform supply chain management activities better than others, is not well defined (Mello and Stank 2005). Specifically, according to Mello and Stank (2005): “without a sound understanding of the building blocks of culture that influence firm behavior it will be difficult to successfully implement Supply Chain Management initiatives”. This is the main gap recognized by the literature and the motivation for the research presented in this paper, which is the lack of definition of supply chain collaboration culture. The aforementioned proposed models offer a basis for research, but do not provide the necessary theoretical foundations for a research design, since they are not tested. On the contrary, more generic Information Systems literature on culture is much wider, includes several surveys and is directly related to the overall literature on organizational culture. Thus, Information Systems theory on culture can be used as a sound basis for research on electronic supply chain collaboration (which after all is a part of Information Systems Literature, although examined using terms such interorganizational systems). However it is important to note that researchers discussing culture in electronic supply chain collaboration research use the term in order to characterize all the internal company characteristics (not environmental) that may influence the phenomenon.

The cultural perspective of organizations emerged in the late 1970s and early 1980s (especially in Japan). The concept of culture was introduced in information systems research in the early 1990s. Culture is considered at that time as a key issue in Information Systems Management (Watson and Brancheau 1991).

Giving a definition to culture is quite difficult. Indicatively Kroeber and Kluckhohn (1952) identified 164 definitions of culture. Nevertheless, there is ground theory around culture, although most researchers in Information Systems research on culture base their work on theories of organizational behavior, such as those of Schein and Hofstede.

Schein defines the three levels model of culture (Schein 1985), which are:

- basic assumptions are at the core of culture and represent the belief systems that individuals have toward human behavior, relationships, reality, and truth.

- values represent a manifestation of culture that signify espoused beliefs identifying what is important to a particular cultural group. These values answer the question as to why people behave the way they do (Schein 1985).
- culture is manifested through artifacts and creations which are the most visible manifestations of culture.

Schein (1985) also argues that values are more easily studied than basic assumptions, which are invisible and preconscious and therefore not easily studied, as well as cultural artifacts (technology, art, visible and audible behaviors) that, while being most visible, are not easily decipherable.

There are five different themes in research that link the concepts of anthropology to organization theory (Smircich 1983): Cross cultural or comparative management, Corporate culture, Organizational Cognition, Organizational symbolism, Unconscious processes and organization. The first two examine how culture can be managed (assuming culture as a critical variable), while the latter three examine the organization as a societal phenomenon (assuming culture as a root metaphor, something an organization is) (Mcgrath, 2003; Leidner and Kayworth, 2006). Specifically for Information Systems research there are six different themes by level of analysis identified (Leidner and Kayworth, 2006): “Culture and IS Development”, “Culture, IT Adoption and Diffusion”, “Culture, IT Use and Outcomes”, “Culture, IT Management and Strategy”, “IT’s Influence on Culture” and “IT Culture”.

These themes are examined by several culture methodologies which include lab experiment, survey, case study, multi method, ethnographic, grounded theory, archival data analysis and structural analysis. In the categorization of methodologies provided by Leidner and Keyworth (2006), each of the six themes uses more than one methodologies for research. Additionally there are two main streams of research: national and organizational culture. National culture (or cross-cultural) research and organizational culture research have emerged as largely separate research streams. Although these two streams are not overlapping, they both aim to define the values that distinguish separate groups (Leidner and Kayworth, 2006). The main difference between the two streams is that the national culture research has focused on a few and well regarded taxonomies of values (e.g. Hofstede values), while the organizational culture research has experienced a much wider range of values (Leidner and Kayworth, 2006).

2.3 Collaborative Climate - Research Question

The aforementioned literature on supply chain collaboration prepared the ground for the definition of a research question, which is finally stated within the framework of the pertinent literature on Information Systems Culture. If and how organizational culture influences the intention to adopt electronic supply chain collaboration services. Consequently, this research views culture (and specifically organizational values) as a critical variable since its purpose is to establish a relationship with other variables and fits to the theme of corporate culture, which views culture as an internal organizational variable in the same way as structure, size and technology in use (Mcgrath, 2003; Leidner and Kayworth, 2006).

However, it became clear in the initial stages of the research design and especially after the focus groups that the introduction of culture in this research context as a solid structure was not possible. Although organizational culture has considerable theory background, the main reason for not adopting it is that the research on organizational culture only was far too focused to take into consideration all the company’s internal factors influencing its intention to collaborate. Organizational cultures are generally deep and stable. Climate, on the other hand, is often defined as the recurring patterns of behavior, attitudes and feelings that characterize life in the organization (Isaksen & Ekvall, 2007). Climate is an approvable term since it is based the term organizational climate. There are two approaches in literature towards organization climate. The first approach regards the concept of climate as an individual perception and cognitive representation of the work environment. From this perspective climate assessments should be conducted at an individual level. The second approach

emphasizes the importance of shared perceptions as underpinning the notion of climate (Anderson, & West, 1998; Mathisen & Einarsen 2004). Reichers and Schneider (1990) define organisational climate as "the shared perception of the way things are around here". There is no "best" approach and they actually have a great deal of overlap. Nevertheless, they ideally describe in one term the outcome of the focus groups.

Thus the term collaborative climate was adopted in order to incorporate both the cultural aspects of collaboration and other items composing the company's internal environment and the research question changed to "If and how the company's collaborative climate influences the intention to adopt electronic supply chain collaboration services." Thus the purpose of this research changed to an effort to identify the components of collaborative climate.

3 RESEARCH DESIGN AND HYPOTHESES

In order to answer this question the research design included two research phases. The first was of exploratory nature, qualitative and included case studies, focus groups with experts and in-depth interviews. This phase intended to clarify all the relevant organizational values that may influence electronic supply chain collaboration, in order to define culture in the specific context. The outcome of this phase was the selection of the term collaborative climate instead of collaborative culture. The findings of this research were used as a basis for the theoretical research model. This approach conforms to the identified increase of direct observation methods of a more interpretive nature in the supply chain management research (Sachan and Datta, 2005). The second phase is of a more confirmatory nature, includes an extensive field study in order to validate the theoretical model. This phase also conforms to the observation that supply chain management research is moving from exploratory to model building and testing (Sachan and Datta, 2005). Additionally, the methodologies used for the "Culture, IT Adoption and Diffusion" Information Systems Theme of organizational research identified by Leidner and Kayworth (2006) also support the selection of these methodologies, since the only methods that they identified were survey, case study, longitudinal case study and multi-method approach.

In regard to the qualitative research, the main goal was firstly to select from all the culture characteristics identified in the pertinent literature, those that in fact may influence the adoption and use of supply chain collaboration services. The two focus groups were dual moderator focus groups and took place with market experts within the framework of an "e-business forum" (a standing State consultation mechanism with the business and academic community, social and professional agencies). The participants of the focus groups were executives from both electronic service providers (intermediaries) as well as executives from high profile organizations. The results of the focus groups were integrated with results from personal interviews that also took place in the same period. The process in these meetings included three steps. Firstly, the participants were allowed to freely state their opinion about factors affecting the adoption of supply chain collaboration services. In this discussion the concept of 'culture' came-up and clearly stand out as an important determinant. Then the participants were asked to freely discuss what aspects of culture they thought were important in the specific context. Finally, participants were asked to select from a questionnaire those items and values of culture that suited most, as identified in the pertinent literature. The results from the aforementioned process were processed in order to create the items to be included in the field survey. The participation of market experts in the process ensured the relevance of the items to the research context.

The final most important step was the development of the instrument that was used to test the theoretical model, which is discussed in the following paragraphs. The designed questionnaire was validated with practitioners and pre-tested using in-depth interviews.

In order to validate the relevance of the research of organizational climate it was necessary to introduce it in an already tested and related context. For this purpose institutional pressures theory was adopted,

Institutional pressures were recently tested in a relevant environment in the work of Liang et al. (2007), who examined the assimilation of enterprise systems and the mediating role of top management. In this work they bring together the concepts of adoption of information systems, the role of top management and institutional pressures and in that way building a ground for this research designs.

However, our research design for the institutional pressures part was based on the work of Teo et al. (2003) examining the intention to adopt interorganizational linkages. The model of Teo et al. was selected because it is more relevant to the electronic collaboration context (it examines the intention to adopt interorganizational linkages) and it is an overall model that seems to explain all external pressures a company receives for the intention to adopt interorganizational linkages. Furthermore, it was recently tested and confirmed. Assuming the model “works” for the “three pillars” of isomorphic pressures, then this will increase the validity of any supported hypotheses. However, integration of the construct of collaborative climate into this model is done with consideration (given that the Teo et al.’s model is grounded on institutional theory) and for exploratory purposes. Moreover, the test of the overall model provides a more complete picture, since it includes both external and internal pressures.

Nevertheless, the work of Liang et al. (2007) provided the inspiration for using the management’s beliefs about the e-marketplace impact as a mediator to the process of adoption of collaboration services. Thus, the measurement of perceived impact of e-marketplace participation was included in the survey. The inclusion of the perception of the impact from the use of Business-to-Business e-commerce application, in the examination of a population that already use some relevant services and thus, is both necessary and interesting to be investigated statistically. The measurement of the impact of e-marketplace participation was based on the literature and the in-depth interviews with market experts. The most commonly found metrics were selected from the bibliography and then by e-marketplace executives.

The exploratory nature of this research in regard to the recognition of the components of collaboration climate led us to the inclusion in the questionnaire of several items. The construct(s) of climate includes those items that were found to be relevant to the specific research context through the initial screening of the literature and of the focus groups. These include:

- Technological status-technophobia
- Internal Collaboration – Cooperative norms
- Innovativeness
- Trust
- Bureaucracy-Centralization-Structure
- Openness
- Top management support
- Short-long term orientation
- Change management ability

Not all of these were found to be statistically important. The statistical analysis of the next section presents the analysis based on those items that were found to be significant. The next discussion section argues on the selected and rejected items.

Finally, in regard to the dependent variable, two representative services were selected through the focus group filtering: E-invoicing and CRP. E-invoicing is defined as the exchange of invoices through the web, using an electronic intermediary. CRP is defined as retailers’ Central Warehouse replenishment based on established collaboration processes (Continuous Replenishment Program). According to the collaboration model applied the supplier has partial or total inventory management of his products in the retailers’ Distribution Center, comparable to the PCSO process at store level replenishment. These

services were selected namely because of the different levels of supply chain collaboration that they represent, which conforms with the McLaren's (2002) categorization of collaboration services.

Figure 1, presents the overall research model.

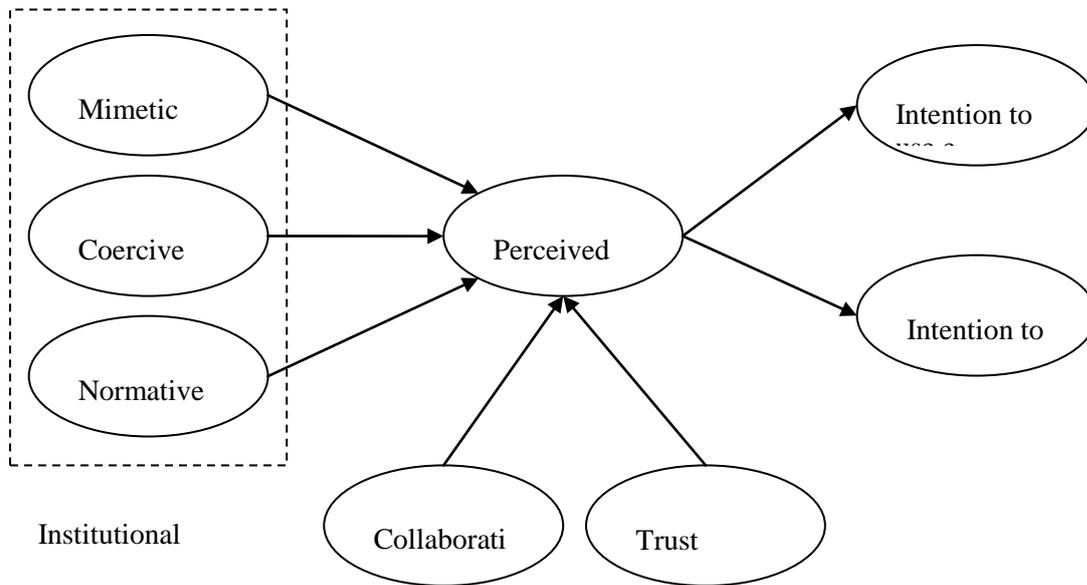


Figure 1. The research model

The main research hypotheses that are expressed through the model are the following:

- H1. The mimetic pressures a company receives affect the company's perception of the impact of e-marketplace participation.
- H2. The coercive pressures a company receives affect the company's perception of the impact of e-marketplace participation
- H3. The normative pressures a company receives affect the company's perception of the impact of e-marketplace participation
- H4. The climate of a company affects the company's perception of the impact of e-marketplace participation
- H5. The trust of a company affects the company's perception of the impact of e-marketplace participation. Not
- H6. The company's perception of the impact of e-marketplace participation affect the intention to adopt electronic supply chain collaboration services.

Company size is a control variable.

The measures in detail are provided in the appendix.

The statistical analysis of the questionnaires is presented in the following section and includes firstly some descriptive statistics about our sample and then the testing of the model using Partial Least Squares (PLS) Path modeling using the Smart PLS software. The PLS analyses include Reliability of constructs (Cronbach's alpha), Convergent validity (Ave values), Discriminant validity (RMS of ave values with construct correlations) and t-values in boot strap for path validities.

4 RESULTS

This section presents the results of the study which are further discussed in the following section and includes the descriptive statistics for the results and then the hypotheses testing using PLS. Since the research model contains both reflective and formative constructs, and we have a relatively small sample

size, partial least square was chosen for data analysis. Unlike a covariance-based structural equation modeling method such as LISREL, PLS employs a component-based approach for estimation purposes (Lohmoller 1989), and can handle formative constructs (Chin et al. 2003). In general, PLS is better suited for explaining complex relationships as it avoids two serious problems: inadmissible solutions and factor indeterminacy (Fornell and Bookstein 1982).

Before discussing the results, in regard to the sampling framework, the sample included companies that already use or plan to adopt a supply chain collaboration service through e-marketplaces. These companies were contacted through intermediaries such as e-marketplaces and e-service providers. The country of study was Greece and the data collection took place between January and February 2008. The sample size includes 81 questionnaires from 81 companies-users of electronic supply chain collaboration services. Initially 89 questionnaires were received but 8 questionnaires were rejected due to too many missing values. The respondents included namely CEOs, CIO and Head Buyers. It is important to note that Business-to-Business e-marketplaces exist in Greece prior to 2001 with more than 2,500 companies participating currently.

As already mentioned our sample included companies that already participate in e-marketplaces and use some electronic supply chain collaboration services. 75.31% of the respondents already use electronic ordering, 59.26% electronic auctions and 43.21% e-procurement. All of these companies participate in an e-marketplace 28.40% percent registered to an e-marketplace between 2005 and 2008, 41.98% percent between 2002 and 2005 and 11.11% earlier than 2002. In regard to the size of these companies, 60.49% of these companies have a turnover lower than 5 million Euros, 7.41% of these companies have a turnover between 5 and 25 million Euros and 27.16% of the companies have a turnover higher than 25 million Euros. Consequently, this is a balanced sample including both Small and Medium companies as well as large organization. All of these companies have considerable experience in the use of internet for Business-to-Business e-commerce.

In order to test the model using PLS it is necessary to firstly test the model's constructs for Internal consistency, Discriminant validity and Convergent validity. Internal consistency is usually measured with Cronbach's alpha, a statistic calculated from the pairwise correlations between items. Internal consistency ranges between zero and one. A commonly-accepted rule of thumb is that an α of 0.6-0.7 indicates acceptable reliability, and 0.8 or higher indicates good reliability. Table 1 summarizes the results for the constructs' Cronbach's alpha.

	Cronbachs Alpha
Coercive Customer	0,964980
Coercive Supplier	0,956142
Perceived Impact	0,932710
Climate	0,904473
Mimetic	0,913433
Normative	0,588673
Trust	0,923428

Table 6: Internal Consistency

The results indicate that all the constructs have high internal validity with the exception of Normative pressures. A possible explanation for this figure could be that the questionnaire used incorporated the original items of Teo et al. (2003), which was inappropriate for the specific sample (user companies, Greek environment). In this initial statistics there is a separate Trust construct since it can be found as a solid entity in the literature.

Convergent validity is the degree to which an operation is similar to (converges on) other operations that it theoretically should also be similar to. In order to have convergent validity the loadings of the constructs should be higher than 0.7, the communality of the constructs should be higher than 0.5 and

the Average Variance Extracted (AVE) should be higher than 0.5. Table 2 summarizes the results for communality and table 3 the results for the AVE.

	communality	AVE
Coercive Customer	0,879174	0,879174
Coercive Supplier	0,795799	0,795799
Perceived Impact	0,748847	0,748847
Climate	0,601357	0,601357
Mimetic	0,791318	0,791318
Normative	0,241660	0,241660
Trust	0,557596	0,557587

Table 7: Convergent Validity

Discriminant validity describes the degree to which the operationalization is not similar to (diverges from) other operationalizations that it theoretically should not be similar to. In order to have sufficient discriminant validity the Root square of AVE should be greater than the inter-construct correlations (Fornell, 1981, Chin 1998) and for the Cross loadings, the indicator with greater load in its Latent Variables than others Latent Variables. The table of Cross loadings is provided in the appendix.

	Coercive Customer	Coercive Supplier	Intention CRP	Perceived Impact	Climate	Intention E-Invoicing	Mimetic	Normative	Trust
Coercive Customer	0,937643								
Coercive Supplier	0,081341	0,892076							
Intention CRP	0,191598	0,002070	1,000000						
Perceived Impact	0,287385	-0,084862	0,199134	0,865359					
Climate	0,351760	0,217273	-0,073286	0,349597	0,775472				
Intention E-Invoicing	0,293561	0,138209	0,661998	0,178376	0,036938	1,000000			
Mimetic	0,292036	0,201497	0,190158	0,403581	0,358972	0,180055	0,889561		
Normative	0,241807	0,204165	0,070925	0,478428	0,320890	0,010673	0,270219	0,491589	
Trust	0,146756	0,007923	0,108617	0,071296	0,268669	-0,015557	0,277307	0,089750	0,746717

Table 8: Inter-construct correlations

Sq. AVE with bold

The aforementioned results explain why coercive pressures was separated to two constructs, since convergent validity and discriminant validity both indicate that they are two separate constructs. This fact could have considerable implications in future research.

With the rejection of the normative pressures construct, the model presented in the previous sections changes to figure 2, which is the final model tested using bootstrapping. Unfortunately the remaining of the hypotheses including normative pressures could not be tested.

Bootstrapping is the practice of estimating properties of an estimator (such as its variance) by measuring those properties when sampling from an approximating distribution. One standard choice for an approximating distribution is the empirical distribution of the observed data. In the case where a set of observations can be assumed to be from an independent and identically distributed population, this can be implemented by constructing a number of resamples of the observed dataset (and of equal size to the observed dataset), each of which is obtained by random sampling with replacement from the original dataset. In order for to have path validity for the hypotheses t-Test should be higher than 1.7. Figure 2 presents the path validity and figure 3 presents the path coefficients based on the R2 calculation.

Consequently in regard to our Hypotheses:

H1. The mimetic pressures a company receives affect the company's perception of the impact of e-marketplace participation. **Supported**

H2. The coercive pressures a company receives affect the company's perception of the impact of e-marketplace participation. **Not supported**

H3. The normative pressures a company receives affect the company's perception of the impact of e-marketplace participation. **Not applicable**

H4. The climate of a company affects the company's perception of the impact of e-marketplace participation. **Supported**

H5. The trust of a company affects the company's perception of the impact of e-marketplace participation. **Not supported**

Figure 7: Path Validities

The next section of the paper discusses these results

Figure 8: Path Coefficients

The discussion of the results offers some interest insights for the research. The following discussion begins with the results of the focus groups and continues with the discussion of the field survey.

The main finding of the focus groups was that there is a point in researching culture as a factor that affects the adoption of supply chain collaboration services. It was impressive that the participants when asked about parameters that influence the decision to participate in an e-marketplace or adopt innovative collaborative service came up unbiased with the term corporate culture as the main parameter. This observation in both focus groups with different participants confirmed the research direction to be relevant. Based on this observation the next step was to ask the focus groups members to identify the factors that compose this "culture". It became clear on the later stage of processing the focus group data, that the term collaborative climate was more appropriate than the term collaborative culture.

According to the participants, the main factor that indicates that a company has the culture to adopt electronic services for interorganizational linkages is technological status or technophobia. In other words, how advanced is the technological status of a company and how the company positions itself

towards new technologies and systems. The technological status can be identified by the existence and status of the Information Systems Department, the role of the Information Systems Manager in the company, as well as the outsourcing experience of the company. Specifically, it was stated that companies that do not own their IT department, but use outsourcing are indicated as more receptive to electronically collaborate with their partners. Especially for outsourcing, companies that in general tend to outsource are considered more receptive to allow other partners inside their organization. According to the participants, outsourcing indicates that the company tends to trust other parties and that it has experience in allowing information to get out of the organization. This is related to the openness value that is met in culture literature.

Experience in outsourcing could also be used as an indication that the company has an experience in managing change. Resistance to change and change management were also strongly considered as factors that could affect the success of adoption of new processes. However the discussion could not provide more items to measure resistance to change, since it requires more in-depth company understanding.

Another factor identified by the participants was professionalism of the project stakeholders. According to the focus groups it is more likely for companies with highly professional executives to adopt collaboration services. Professionalism also exists in the perpetuate culture literature as a value. Professionalism was considered in the focus groups to be related to the structure of the organization. Companies with many hierarchical levels and more vertical structure are thought to be less likely to have a culture that is going to assist the implementation of interorganizational linkages, than companies with more flexible organization. More flat organization chart could denote that the various departments are used to cooperate and share resources. It could also indicate that they are used to collaborate inside the organization and thus to be more receptive to collaborate outside the organization. As already mentioned, these issues are not irrelevant to previous culture research in Information Systems as Leidner and Kayworth (2006) indicate. For example there is research on bureaucracy, hierarchy process and normative values, administrative and professionalism, within other Information Systems Contexts. Moreover, the type of management of the organization can play a key role in the adoption phase. A more centralized management (or family-owned companies) have more strict decision process that depends on the opinions of one or two executives, which can be either beneficial or not. Beneficial if the culture of this particular person is the appropriate and in terms of stability in the company, which also assists the overall process. Not beneficial in the case of this particular person not having the appropriate culture. Due to this reason it is not clear whether management concentration as an item could provide any interest insights. Nevertheless, the participants agreed that the long-term or short-term strategic orientation of the management also plays a role in the intention to adopt new services.

Finally, another issue that emerged from the discussion was trust (which is also mentioned in outsourcing) in terms of how much a company trusts the partners and in terms of how ready is a company to trust its partners. Trust is also an issue related to supply chain collaboration culture by researchers such as Barrat (2003) and Mello and Stank (2005), who include it in their research propositions. It is regarded as an issue that worth further investigation.

Some of the aforementioned cultural characteristics are met in the literature, while some others are new. In regard to the four elements of Barrat (2004) (Trust, Mutuality, Information Exchange and Openness and Communication), firstly, this research confirms the importance of trust. Furthermore, this research indicates that openness and communication can be measured indirectly by other company characteristics, such as bureaucracy and outsourcing. On the other hand, factors such as mutuality were not considered so important. A possible explanation is that it is a given that the two parties will have a mutual involvement in the project and this is not a factor that is going to affect the success of the collaboration attempt. Nevertheless, this is a hypothesis. Information exchange on the other hand is usually referred in the literature as a factor composing supply chain collaboration and thus it should be clarified in what form influences supply chain collaboration culture. In regard to the five shared values of Mello and Stank (2005) (Trust, Commitment, Cooperative Norms, Organizational Compatibility and Top

Management Support), this findings once more confirm the importance of trust. This research also builds on commitment and top management support, since these are values related to the results of the focus groups. The main difference is in cooperative norms and organizational compatibility. Organizational compatibility is an issue that came in the discussion, but it was not possible to better define it using more specific items. Nevertheless, it became clear that people participating in the collaboration have a key role in the adoption and success of the partnerships.

These findings were put to question through the field study. Based on the literature and with the contribution of market experts we selected culture items with relevance to the specific context. These included: Technological status-technophobia, Internal Collaboration (Cooperative norms), Openness, Innovativeness, Trust, Bureaucracy-Centralization-Structure, Top management support, Short-long term orientation, Change management ability. The statistical analysis indicated that there is indeed a collaborative climate factor that influences the perception of collaboration and thus the intention to use such services, which is composed namely by internal collaboration, technology orientation, top management support, innovativeness. Nevertheless, this is an initial exploratory research, so it is expected that in the future even more components will emerge to define the company's collaborative climate.

Although the statistical analysis validated the importance of such concept as a reflective construct, further research is required in order to specify its components through the development of new constructs. This was not possible in this research, since the efforts to separate the collaborative climate construct offered units that do not have significant discriminant and convergent validity to support hypotheses.

The previous chapter presented the hypothesis testing. It was expected that if the already researched constructs of Teo et al. for institutional theory are confirmed in this survey then the results for the collaboration climate hypotheses will be more valid. However it was not possible to check all three of the external pressures (mimetic, coercive, normative), since the normative pressures construct did not pass any of the aforementioned tests. As mentioned in the previous section, it is suggested that a possible explanation for this could be that the questionnaire used incorporated the original items of Teo et al. (2003), which was inappropriate for the specific sample (user companies, Greek environment). This fact alone has considerable implications for future research. There is now ground to suggest that there is more work to be done in the field of interorganizational information systems in order to have a generic measure for normative pressures and until this is possible more exploration in regard to items is necessary.

However, even with the exclusion of normative pressures from the tested model, there are still important findings from this analysis. It is suggested that the perception of the impact of e-marketplace participation is influenced by the mimetic pressures an organization receives from his competitors, while it is not influenced by the coercive pressures from neither his suppliers nor customers.

This fact emerges several managerial implications. Firstly, there are several observations to be made in regard to the propositions of Teo et al. (2003). Teo et al. discussed thoroughly the adoption strategy that vendor companies should follow to approach new members. According to their survey, technology vendors should highlight both the adoption among an organization's competitors and name reference sites that have successfully adopted the technology. Additionally they encourage technology vendors to work with early adopters to help develop promotion programs that could address the concerns of those potential adopters. Our research indicates that highlighting the success of competitors does not only influence the intention to use collaboration services but also the perception of impact from the users. Practically, this means that if a company considers that its competitors have succeeded from the use interorganizational services, not only they will be more receptive to adopt new collaboration services, but they will also consider their use of such services as more successful. A possible explanation could be that even though managers do not consider that they achieve a competitive advantage through

electronic supply chain collaboration, they feel that they avoid a possible competitive disadvantage towards their competitors.

Furthermore this research indicates that the perceptions of the impact of e-marketplace participation, as well as the intention to use, are also influenced considerably by the internal climate of the company. Although existing literature and expert's opinions have highlighted the importance of culture and human resources in both use and adoption of electronic supply chain collaboration (as indicated in the provided literature review) there is now evidence that this is a reality with much more implications than expected. Now, it can be suggested to practitioners that it is not enough to examine environmental factors in order to increase the intention to adopt interorganizational systems, but also internal factors. These factors differentiate significantly the companies, and thus addressing each company according to its special individual needs can be considered as mandatory.

In regard to trust, this research shows that it does not influence the perception of benefits. Given that both literature and focus groups strongly support the role of trust, further research is required. A possible explanation is that trust is more related to strategic B2B electronic services and the sample was not adequate to have indisputable results.

Moreover, this research verifies the existing assumption that previous experience with interorganizational activities (either successful or not) can influence the intention to adopt collaborative services. This means that by examining the perception of the impact of e-marketplace participation (maybe in comparison to initial expectations) practitioners can have indications for the prediction of each company's intention to adopt new relative services.

This proposition can be viewed as an amalgamation of the prediction model of Teo et al. (2003) for interorganizational linkages and the model of Liang et al. (2007) for the assimilation of enterprise systems. The Teo et al.'s (2003) model can be enriched with the mediating role of management's perception in similar way to the work of Liang et al. (2007). The presented study discusses the mediating role of the management's perception about the impact of services related to those that the same managers are also asked about their intention to adopt. By doing so, this study provides basis for future research towards this direction. There for it is strongly recommended to potential researchers in the field of interorganizational linkages to take into account the human factor through its individual perceptions for both the environment and the system.

6 CONCLUSIONS

The initial intention of the research presented was to enquire on whether culture and organizational values in fact affect electronic supply chain collaboration and to validate that there is some relevance for this research. The findings presented in this paper are used firstly to support the relevance of such research and secondly to present some first ideas on how collaborative climate in general and collaborative culture in particular influence electronic supply chain collaboration services and the intention to adopt. The output and main contribution of the research is the recommendation to introduce of two more variables (currently ignored in the pertinent literature) to the equation of adoption of collaborative linkages in addition to external pressures and service specific, which are the perception of the impact of e-marketplace participation of companies already using B2B e-commerce applications and the pressure from a company's internal climate.

This research is expected to contribute to several specific areas of research. The main contribution of this research is an initial definition of the organizational 'collaboration climate' or in other words the internal company characteristics and cultural values that influence the companies' intention to adopt and use of electronic supply chain collaboration services. Culture could be used as a term expressing internal company characteristics that influence collaboration, such as internal collaboration, technology orientation, innovativeness and other cultural concepts (which were tested through the survey). Moreover, this research is expected to contribute to the generic discussion in the area of supply chain collaboration and interorganizational linkages, especially by proposing either antecedents or moderating

factors for not only the process of supply chain collaboration initiation, but also for the process of value creation and value assessment. More specifically this research may fill gaps in existing research, and it may extend understanding of particular topics such as those presented in this paper's literature review. Furthermore, more knowledge could be added to the research area of culture in Information Systems Research, since interorganizational systems is a significant area of information systems. In the process of providing a definition, this research proposed and tested an enhanced overall model that could provide additional approaches to the overall context of electronic supply chain collaboration and interorganizational linkages. What we may conclude for the overall model is that the model of Teo et al. (2003) can explain the process of adopting more operational interorganizational linkages but the understanding of the overall intention to adopt requires the examination of more internal pressures and taking into consideration the human factor and his perceptions.

Nevertheless, there are some limitations for the presented research that cannot be ignored. The main limitation of the survey was the medium sample, which prevented the use of more advance techniques for the statistical analysis of the results. Another limitation was that the survey took place only in one country (Greece) and thus further validation of the results is needed.

The authors' intention is to trigger further research within the framework described in this paper. The aforementioned analysis suggests that the construct of coercive pressures should be examined separately for retailers and suppliers as two separate entities. It is proposed that future researchers take this into consideration in similar surveys. A suggestion to researchers that decide to expand the research presented in this paper is to treat the collaborative climate construct as formative rather than reflective, in order to identify its components. Further research could be made to several levels. Additional culture characteristics could be tested in new surveys. The cultural characteristics tested in this research could be included in new models examining other aspects of electronic supply chain collaboration in order to test their validity within an overall framework. Finally it would be interesting to repeat this same survey in a different population, most likely with as sample of companies that are not participating or do not have electronic commerce or collaboration experience.

The analysis of the research data continues (with data not presented in this paper) and it is expected that they will contribute to the better understanding of culture mechanisms. Nevertheless, it is anticipated that this paper would provide motivation to researchers to address the complex issue of electronic supply chain collaboration from innovative views non-existed today.

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Appendix

Variables:

Mimetic Pressures

Perceived Extent of Adoption by Competitors: 1-None has adopted: 7-All have adopted

What is the extent of adoption by your firm's competitors currently?

Perceived Success of Competitors that have adopted: 1-Strongly Disagree: 7-Strongly Agree

My main competitors that have adopted:

have benefitted greatly

are perceived favorably by others in the same industry

are perceived favorably by suppliers

are perceived favorably by customers

Coercive Pressures

Perceived Dominance of Suppliers that have adopted: 1-Strongly Disagree: 7-Strongly Agree

With regard to my main suppliers that have adopted:

my firm's well-being depends on their resources.

my firm cannot easily switch away from them

my firm must maintain good relationships with them

they are the core suppliers in a concentrated industry

Perceived Dominance of Customers that have adopted: 1-Strongly Disagree: 7-Strongly Agree

With regard to my main customers that have adopted:

my firm's well-being depends on their purchases

my firm cannot introduce switching costs to them

my firm MUST maintain good relationships with them

they are the largest customers in the industry

Normative Pressures

Conformity with Parent Corporation's Practices: (Yes: No:)

Has your parent company adopted?

Perceived Extent of Adoption by Suppliers 1 - None has adopted: 7 - All have adopted

What is the extent of adoption by your firm's suppliers currently?

Perceived Extent of Adoption by Customers: 1 - None has adopted: 7 - All have adopted: Don't know

What is the extent of adoption by your firm's customers currently?

Intention to Adopt: 1 - Strongly disagree: 7 strongly agree

I am likely to adopt in a year's time.

Climate

Cultural characteristics: 1 - Strongly disagree: 7 strongly agree

Organization's employees understand the importance of technology?

The organization outsources some of the processes? (excluded from the statistical analysis)

The organization has reduced bureaucratic procedures in the last couple of years? (excluded from the statistical analysis)

The organization management is dependent to one person (chairman, manager, owner)? (excluded from the statistical analysis)

The organization has few hierarchical levels? (excluded from the statistical analysis)

Employees are encouraged to research and experiment?

Employees are encouraged to train?.

Employees are valued for their skills and not their credentials?

Employees seek help when they need to?

Employees cooperate with other teams internally in the organization?

Employees discuss their work with other teams?

The organization prefers short-term results? (excluded from the statistical analysis)

The organization prefers long-term results? (excluded from the statistical analysis)

The organization prefers technological evolution that traditional organization?

The organization avoids changes due to reaction to this changes? (excluded from the statistical analysis)

Top management supports and presses for the adoption of new technologies?

Trust

In this relationship we keep promises we make to each other?

Each party believes the information provided by the other?

We both find each other trustworthy?

Impact of e-marketplace participation

Taking into consideration your company's entire participation in the B2B e-marketplace you believe that the following factors were affected: 1 – negatively: 7 - positively

Personnel productivity

Lead time

Processing time

Profitability

Internal cost

Competiveness

Quality assurance

Cross Loadings:

	Coercive Customers	Coercive Suppliers	Intention CRP	Impact	Climate	Intention e-Invoicing	Mimetic	Normative	Size	Trust
CS1	0,090772	0,958051	0,024180	-0,060137	0,261833	0,170609	0,153865	0,221114	0,104890	0,009505
CS2	0,097203	0,966835	-0,013786	-0,053920	0,220754	0,140823	0,213958	0,249279	0,027107	0,017844
CS3	0,079376	0,810695	0,127493	-0,001419	0,331362	0,165388	0,214629	0,205393	-0,015482	-0,001951
CS4	0,128135	0,820572	0,024381	0,029193	0,316140	0,207984	0,122483	0,317859	-0,022420	0,028849
N1	0,275835	0,372343	-0,011281	0,281256	0,134503	0,034369	0,225759	0,632939	0,238203	-0,070163
N2	0,628525	0,356132	0,212397	0,054401	0,269880	0,364650	0,338329	0,166300	-0,034908	-0,043994
N3	0,162048	0,630231	0,058102	0,118687	0,364865	0,090313	0,261015	0,485141	0,040340	0,068811
N4	0,086473	0,342826	-0,045379	-0,327211	-0,123729	0,109071	-0,005801	-0,550462	-0,015401	-0,159171
M1	0,200613	0,473894	0,200984	0,204480	0,214036	0,225673	0,788009	0,241608	0,427281	0,220703
M2	0,319157	0,197698	0,194032	0,390343	0,408159	0,170246	0,973808	0,267353	0,314227	0,254169
M3	0,238431	0,118793	0,081368	0,330092	0,405007	0,074918	0,895869	0,238272	0,295098	0,367372
M4	0,260400	0,077687	0,204644	0,438497	0,292895	0,190876	0,890747	0,226443	0,226743	0,170587
CC1	0,981436	0,052981	0,231814	0,263963	0,305452	0,345435	0,282975	0,211917	-0,025509	0,172296
CC2	0,979331	0,137738	0,173992	0,303296	0,405172	0,245484	0,321377	0,289507	-0,010423	0,134378
CC3	0,837346	0,229472	0,195946	-0,055938	0,287973	0,262870	0,259946	0,054726	-0,023454	0,122132
CC4	0,945115	0,065830	0,141138	0,135910	0,271585	0,266885	0,210471	0,099458	-0,073923	0,104347
IMP1	0,301229	-0,163971	0,161204	0,878156	0,206040	0,120646	0,275927	0,343121	0,011860	0,077674
TR1	0,196452	-0,007388	0,114888	0,057109	0,297099	-0,043800	0,273196	0,051410	0,191953	0,980721
TR2	0,322770	-0,069684	0,120176	-0,003461	0,323447	-0,063869	0,152286	-0,064406	0,111532	0,594594
TR3	0,291178	-0,051900	0,091505	-0,010737	0,286607	-0,143504	0,176420	-0,103092	0,095026	0,597836
CL1	0,174208	0,185793	-0,213569	0,239672	0,708037	-0,056403	0,198757	0,258198	-0,110891	0,051241
CL2	0,267053	0,250016	-0,104820	0,330011	0,839563	0,017041	0,230882	0,281131	-0,270265	0,128238
CL3	0,246322	0,236219	-0,043552	0,136689	0,839670	0,068863	0,244053	0,152265	-0,117896	0,324301
CL4	0,317779	0,143522	-0,029359	0,313637	0,808621	0,102766	0,416755	0,166232	0,005075	0,239791
CL5	0,267551	0,084419	0,102282	0,341902	0,739863	0,010740	0,292069	0,328373	0,066907	0,309184
CL6	0,392031	0,213471	-0,071825	0,147462	0,729290	0,082446	0,501776	0,150634	0,180093	0,364348
CL7	0,290738	0,298346	-0,099990	0,185283	0,881593	0,050107	0,336154	0,290991	-0,001992	0,230024
CL8	0,237094	0,025084	-0,057306	0,262783	0,623934	-0,012738	0,173313	0,252205	-0,056220	0,105046
int_crp	0,191598	0,002070	1,000000	0,199134	-0,073286	0,661998	0,190158	0,070925	-0,084616	0,108617
int_inv	0,293561	0,138209	0,661998	0,178376	0,036938	1,000000	0,180055	0,010673	-0,077707	-0,015557
IMP2	0,158888	0,060735	-0,032127	0,829281	0,409582	0,065003	0,407680	0,439483	0,025045	-0,106079
IMP3	0,234095	-0,192826	0,235726	0,845476	0,240336	0,161571	0,319142	0,341192	-0,022023	0,050257
IMP4	0,272311	-0,054107	0,198410	0,913132	0,239381	0,131656	0,323475	0,471542	0,089765	0,055003
IMP5	0,183716	-0,091947	0,254685	0,883636	0,249788	0,259258	0,368722	0,404152	0,117653	-0,035365
IMP6	0,337130	-0,000035	0,187651	0,839504	0,460585	0,166497	0,392288	0,474414	0,046678	0,303465
Size	-0,029213	0,096639	-0,084616	0,054004	-0,063875	-0,077707	0,331440	0,176392	1,000000	0,201047