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CRITICAL MASS ATTAINMENT IN E-BUSINESS TRADING COMMUNITIES

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Abstract

I research about critical mass attainment in e-business trading communities. The term “critical mass attainment” here denotes the boundary of my study. The term “trading community” is defined by not just the market place host, but also by buyers, sellers, potential participants and other related actors (e.g. standards organizations). Critical mass theory is my underlying research logic. The theory formalizes “why a small sample of the population chooses to make big contribution to collective action while the majority does little or nothing” (Oliver et al. 1985). I view trading communities as a collective good. Those who join in and contribute to trade during the infancy stages of a trading community are assumed to make a big contribution. My research thus aims to differentiate those who joined and participated in a trading community earlier from those who did latter. The differentiation is not only made in terms of just characteristics such as size and purchasing volume but also in terms of joining rationale. I assume that a trading community attaining critical mass is due to satisfied buyers and sellers. My research results would help trading communities in improving their marketing effectiveness and trading partners in evaluating a trading community. I do a positivist case study research. Unstructured interviews is my primary research method. Two initiatives that I study are Gatetrade and IBX marketplaces. The first is Government to Business (G2B) and the second is Business to Business (B2B) in nature. The following are two examples of relationships that I have identified based on 25 interviews that I have so far conducted. i) A trading partner’s commitment to an e-biz community is directly related to asset specific investments that he or she has made for joining. ii) An organization would more likely trade through an E-biz community when its purchasing practices within an organization are centralized instead of decentralized.

Introduction

I am a doctoral (Ph.D.) student in the department of computer science, Aalborg University, Denmark. I research about critical mass attainment in electronic business (e-biz) trading communities. Ph.D. in Aalborg University is a three year study. My research spans within August 2001 – July 2004 period. Half way through my research, I have defined research focus, research methodology and have since Feb. 03 embarked on collecting primary data. Primary data collection is going on at a brisk pace. This document argues for my research focus, rationalizes the research methodology adopted and presents preliminary findings.

Research Focus

Coppel (2000) identifies government, business and consumer as three user categories which can interact over the Internet. Each of the three categories can interact either among themselves (e.g. consumer to consumer as in the case of e-bay) or with one another (e.g. business to consumer as in the case of Amazon). Thus, a 3 x 3 matrix results in nine interaction possibilities. Five of the nine categories have gained prominence. They are Business-to-Consumer (B2C), Business-to-Business (B2B), Consumer-to-Consumer (C2C), Government-to-Business (G2B) and Government-to-Consumer (G2C). There are interesting research issues in each of the five categories. However, *my interest lies in studying trading communities within B2B and G2B categories* for the following reasons:

1. In this specialization age, several businesses add value to a good or a service before it reaches end user. The potential for improving efficiency and effectiveness in this information intensive value addition process is enormous. B2B trading

communities inherently have the ability to tap this potential; consultants such as Gartner and Boston consulting have amounted this to trillions of dollars even. Paradoxically, despite this huge potential hundreds of B2B communities got “busted” during “trough of disillusionment” in the hype cycle. Thus, enormous stakes associated with the optimal functioning reinforce the call for studying B2B trading communities. Hence my interest.

2. Government organizations can equally benefit from purchasing through internet trading communities just as businesses do. However, government organizations are not forced to be competitive just as much as businesses are did. Though ever-increasing knowledgeable citizens and businesses and other governments¹ are demanding higher levels of efficiency and effectiveness, governments are not motivated by key variables such as the fear of extinction or losing market share. Researchers, many of whom just as I am are funded by governments, are morally responsible to provide impetus and assist government organizations in making use of emerging opportunities that the internet provides. Hence my interest in G2B trading communities.

B2B and G2B trading communities are not necessarily distinct. Danish government has chosen a trading community (Gatetrade – <https://www.oex.gatetrade.net/home.jsp>) initiated by four major Danish companies for public procurement. I term B2B and G2B trading communities as e-biz trading communities. I consciously use the term “trading communities” instead of “electronic markets (EM) or internet based electronic market places (IEMP)” for meaning of the latter is unclear. The lack of clarity lies primarily in answering the question “can one buyer-multiple seller scenario or it’s vice versa adequate for an EM definition or should there be many buyers and sellers?” (Grieger 2003) explicitly takes a stance on this by stating that an EM should have many buyers and sellers. On the contrary Christiaanse and Markus (2003) bring into limelight collaboration marketplaces (e.g. Elemica) that allow for tighter integration across supply chain between two parties. Traditional EM work such as that of Malone et al. (1987) remains silent on this issue. My interest lies in studying e-business communities regardless of whether or not there are one or many buyers and sellers. Hence, I custom define “trading communities” as an encompassing term that includes not just electronic market places but also buyer and seller initiated communities (e.g. Cisco e-hub). A *community* includes buyers, sellers and intermediaries.

Perspective that I adopt for studying e-biz trading communities is described in my research question, which is

How can critical mass attainment in e-biz communities be explained?

I view e-biz communities as simply an evolution from traditional inter-organizational systems (IOS) such as airline reservation systems and EDI. The IOS area has been researched extensively since mid 80’s. Adoption of EDI technology is researched predominantly. The term “adoption” is operationalized in four ways, which are i) extent of adoption (Saunders and Clark 1992) ii) adoption decision (Drury and Farhoomand 1996) iii) critical success factors (Cavaye and Cragg 1995) and iv) adoption of multiple telecommunication technologies (Grover and Goslar 1993). This shows that knowledge accumulation that IOS adoption studies claim is based on an unstable foundation. Please look at Somasundaram and Rose (2003) for a review of IOS adoption literatures. I hope to avoid the confusion associated with the term “adoption” by instead using the term “critical mass attainment”. Critical mass attainment is a superior dependent variable than adoption because a community can attain critical mass only when its members decide to adopt.

Mahler and Rogers (1999) define critical mass “...as the minimal number of adopters of an interactive innovation for the further rate of adoption to be self-sustaining. The term critical mass comes originally comes from nuclear physics where it referred to the amount of radioactive material required for a pile to “go critical” in a self – sustaining reaction.” Thus, the point *up to which* I study an e-biz trading community is well defined.

Though the IOS area has been researched extensively since mid 80’s, most work took organization as the level of analysis. Christiaanse and Markus (2003) call for researching not just the community host but also buyers, sellers and other relevant actors. In the same line of thought, e-biz community is my level of analysis. I enquire both participants and potential participants for explaining e-biz community emergence. The research question is deliberately left open with “how can...” because e-biz trading communities per se have not been researched scientifically. As there is minimal knowledge about this area, there is a need for exploratory and explanatory research.

¹The US and many European governments for instance pressurize the Indian government to reduce its bureaucracy and become efficient and effective.

Intrigue associated with this question is enormous. Hundreds of e-biz communities failed to attain critical mass during the so-called e-commerce bubble bust. A few however have sustained and in the recent times are emerging successful. Interest therefore lies in explaining the attributes that differentiate successful from failed e-biz communities. Success and failure are measured through profitability.² Traditional research explains innovation as diffusing in a sigmoid (S) pattern (Rogers 1995). Critical mass theory (Oliver et al. 1985) differentiates those adopting an innovation earlier than those latter along the dimensions of interests and resources mainly. In similar lines, I am enquiring about characteristics that differentiate those who have joined an e-biz community earlier from those who join latter and from those who are yet to join. The differences when explained can help i) e-biz communities in better targeting their marketing efforts and ii) businesses and governments in realizing what they have yet to do for benefiting from e-biz community participation. The Meta objective is to minimize e-biz community failures thus saving millions of dollars worth of investments associated with such.

Research Methodology

A large percentage of research work about e-biz communities has been anecdotal in nature (e.g. Archer and Gebauer (1999) and Grieger et al. (2002). Except for a few case studies research (e.g. Gebauer and Segev (2000), Sinnecker and Christiaanse (2001) and Grieger and Kotzab (2002)) and one instance of factor based research (Holzmuller and Schluter 2002) I am unaware of work that are methodology based. E-biz communities are complex in nature just as Christiaanse and Markus (2003) (Holzmuller and Schluter 2002) recognize. Thanks to a decade long EDI work, we can predict the variables associated with e-biz community's complex nature. However, how these variables would act in e-biz community's context is unknown. A methodology that would allow for collecting and analyzing rich data would help to understand the complex dynamics. A range of qualitative research strategies are available for such analysis (Yin (1994), Guba and Lincoln (1989), Eisenhardt (1989), Strauss and Corbin (1990) and Huberman and Miles (2002)). The challenge is to select the one or define a hybrid of many to suit my research focus.

After a thorough analysis of prominent qualitative research strategies, I select Yin's (1989) version of case study research strategy for the following reasons. Firstly, the research strategy is adequately detailed to support a Ph.D. work. Secondly, it adopts a deductive logic for analyzing data. E-biz communities are inter-organizational in nature just as EDI is. EDI technologies have been studied extensively for a decade. EDI knowledge can be used to understand e-biz communities, though I recognize that the new nature of internet technology does have an effect. Thus, it makes sense to build upon traditional EDI work deductively and not in the contrary start all over inductively. However, I prefer Eisenhardt's (1989) suggestion of using theories to help focus on the phenomena studied and be aware of the phenomena instead of hypothesizing theoretical propositions and iteratively testing them as Yin (1994) suggests. Thirdly, as well, deep rootedness in a context reduces the generalizable nature of my results. Finally, I would like to identify mechanisms that govern an e-biz community attaining critical mass. My purpose would be achieved if I am able to develop a theory for "why do some e-biz trading communities attain critical mass while others do not". Yin provides good guidance for theory building.

Yin's case study research strategy is implemented in the following manner. The central/holistic *unit of analysis* in my research is community. Buyers and sellers have to participate in a community for it to attain critical mass. Hence, they are central embedded units of analyses. I propose to carry out a *multiple case* study research. I foresee studying three communities. Just as all qualitative approaches recommend I intend to collect data from multiple *sources of evidence*. Interviews are my primary data source. Interviewees are selected based on their extent of participation and on their potential for participating in an e-biz community. Interview information is supported by that of e-mail conversations, web page information, newspaper articles, internal publications etc. Adequacy of information for providing explanation would determine the extent of interaction. I plan to summarize interviews while at the same time transcribe key highlights of it. "Critical mass" is the *construct (validity)* that I study in my Ph.D. work. Critical mass can be measured mainly through a community's profitability. I adapt explanation building technique as in Yin (1994) for achieving a higher level of *internal validity*. Instead of approaching the problem with theoretical propositions as Yin suggests, I approach with a research framework³. I attempt to ensure *reliability* through thoroughly documenting the research process. Theory that I build would be *generalizable* for explaining critical mass attainment process in G2B and B2B communities. I foresee application for parts of my theory in other internet based communities as well.

²An organization that has attained profitability can eventually dissolve. This scenario however is not my focus. Such scenarios have hardly been occurring. Trend at the moment is defined by communities that have just attained critical mass.

³As it will be discussed in the next section, many independent variables in the framework are based on traditional EDI work.

Research Framework

Critical mass attainment in e-biz trading communities has not been researched before. My research framework (presented in fig. 1) hence is custom prepared using knowledge in the areas of EM, critical mass theory, transaction cost theory, diffusion of innovation theory, socio-political theories, EDI work and other IOS adoption work and above all rationale. I foresee explanations based on how the identified variables affected or got affected in *similar* circumstances but not the *same*. I am open to both of the following; i) a pattern that is identified under other circumstances hold true thereby gets reinforced and ii) a new pattern is found.

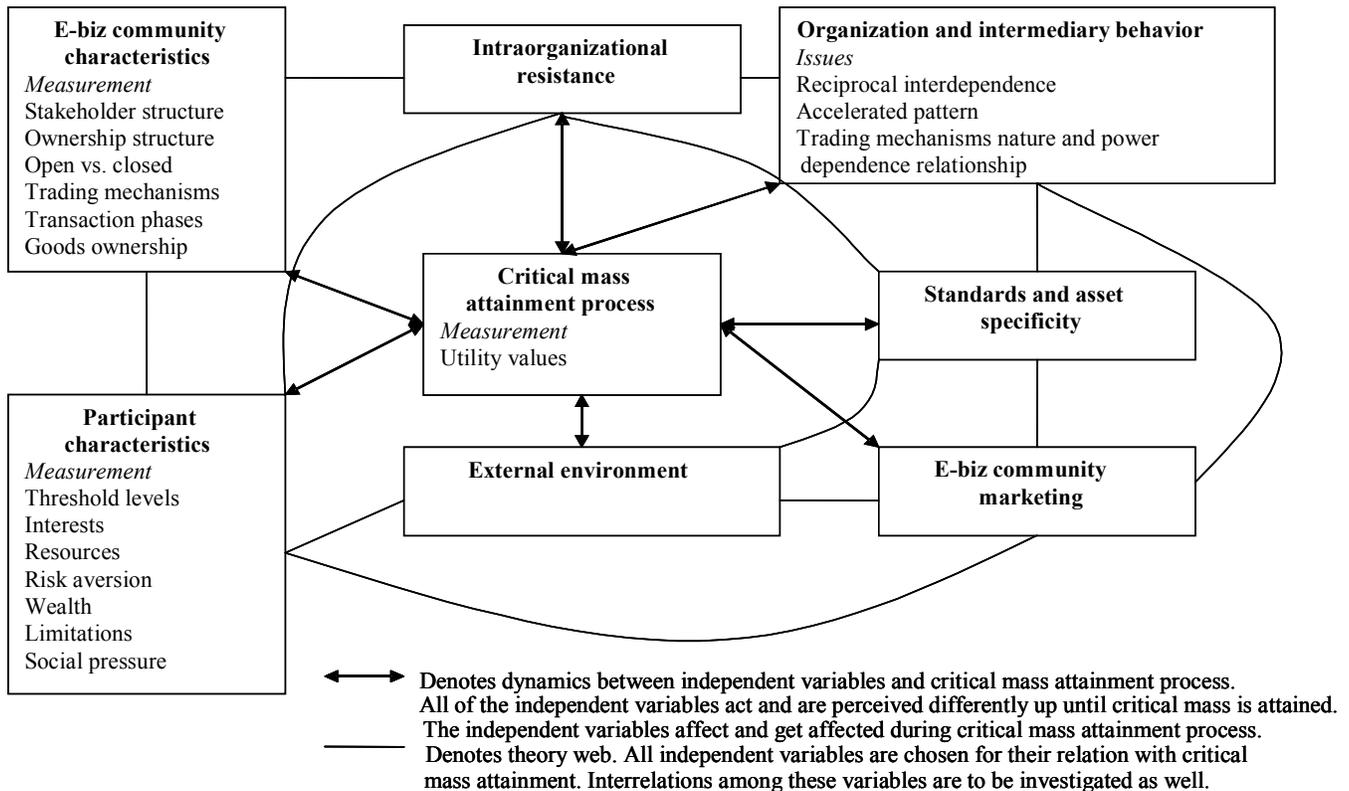


Figure 1. Critical Mass Attainment in E-Biz Trading Communities: Research Framework

The central dependent variable in my research framework is critical mass attainment process. In other words, I am interested in studying e-biz communities the point up to which critical mass is attained. A prominent critical mass measurement is community's profitability. There can be many more such as i) number of members ii) number of participants and iii) volume of trade. The independent variables are i) participant characteristics ii) community characteristics iii) organizational and intermediary behavior iv) standards and asset specificity v) e-biz community marketing and vi) intra organizational resistance.

Though I expect independent variables to have a certain affect on the dependent, my research framework is not a positivist framework like that of Hart and Saunders (1997) and Chwelos et al. (2001). Instead, it guides me in collecting information. This information will be analyzed upon collection, which will then be used possibly for developing positivist research frameworks.

My research framework expands on my research question and gives further details on my research. Variables in the framework are further expanded in terms of theoretical discussions. *Organization and intermediary behavior*, one of the independent variables and its postulated effects on critical mass attainment process is presented here as a sample.

Oliver et al. (1985) predict two types of production function; accelerating and decelerating. Production function relates contribution of resources "to changes in the level of collective good". In the accelerated case, production function curve is shallow in the beginning but then it takes off rather steeply. This means that up until the level where costs of participating is higher than

benefits growth curve is shallow but then it grows steep. In contrast, decelerated curve takes off rather steeply but then grows shallow. Here a contribution that one makes to the collective good during the early stages is regarded highly hence the steepness. However, value of the collective does not rise steeply as contribution value comes down. This dampens participants' interests; hence the deceleration. Markus (1987) apply Oliver et al.'s argument towards a "critical mass" theory of interactive media. In which she argues that accelerated production function is likely in interactive media. This is because a contribution that an individual can make to the collective good can only be minimal. The following are the issues that I enquire in this regard:

- Why did organizations join an e-biz community during the shallow stages of accelerated curve?
- What incentives did intermediaries provide to accelerate the production function curve?

The issues are further operationalized through open yet focused practical questions within an interview guide. As multiple actors are enquired about the same phenomena, validity is ensured. Here are a couple of sample questions.

- To intermediary; have you been providing any specific incentives like reduced transaction costs for instance to encourage participation?
- To buyers; if you joined when there were not so many users, then why did you do that? Has your perception of the e-biz community changed since the number of participants increased?

Concluding Remarks

I welcome all forms of comments on the above mentioned document.

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