UNIVERSITEIT TWENTE

Smartphone Software Markets

The battle in case studies

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Abstract: In this Master Thesis, a model for analyzing and comparing Smartphone Software Markets is proposed. With the model, a market configuration is assessed on influence on adoption for demand and supply. The research findings show that the model is applicable and a closed market configuration is leading to more adoption by customers and suppliers due to more control in the value network, determining user experience.

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Management Summary

Smartphone Software Marketplace (SSM) research is a new and under researched phenomena in the domain of electronic marketplaces [Standing, Standing & Love, 2010]. The recent emergence of SSM as a highly competitive and lucrative business area [Apple, 2007, 2010; Distimo, 2010] with revenues over $4,2 billion in 2009 [Gartner, 2010a] is the main driver for this research.

Earlier work on Electronic Marketplaces proposed a model for trading Knowledge Assets [Müller, 2005]. The trading model can be applied for researching SSMs by assuming that utilitarian content in SSMs are Knowledge Assets, and therefore is used to formulate a hypothesis.

This thesis researches the hypothesis if closed characteristics of SSM configuration design benefits the adoption by suppliers and customers to reach critical mass. SSM configuration design is defined by the Business Model, Value Network, Internal processes and External processes.

By designing and applying a case study protocol, multiple Smartphone Software Markets are analyzed and cross case examined. By analyzing the business model applied, the value network components dominated by market owners and process analysis the SSM are compared. The outcomes are discussed using previous research findings in literature.

The results of the case study analysis show that the currently largest SSM (Apple App Store) is closed in configuration and is growing in content size. By controlling large parts of the Value Network, Apple is able to deliver high user value. The high user value is achieved by internal processes that lower transaction costs by multiple matching processes, a reputation system and prediction software. Furthermore, external processes are creating user value by an internal testing and validation process of content that scrutinizes low quality content, strict regulations on content design and multiple payment processes.

The second largest SSM (Google Android Market) is open in design configuration and growing faster in content size. The user value is high because of differentiation of the market offering by exclusive content and lower effort to create content for developers. Furthermore, one essential actor for other SSM (testing and verification partners) is eliminated from the Value Chain and transformed into a market situation where quality of software becomes the currency. User value and supplier value is lowered by only limited means of payment possible, in selected countries.

Other competitors in SSM still rely on two actor roles (testing & verification partners and signing partners) which result in high market entry and maintenance costs for developers. Furthermore, supply processes with high fragmentation issues make supply likely to fail, therefore lowering supplier value.

Concluding, the first competitor with a SSM benefits from having a closed configuration, but can be threatened by an open competition model due to higher OS adoption. A closed model can work if high internalization of the Value Network is possible, increasing user value and improving revenues due to clear product differentiation. Open configurations

have higher chance of adoption by the use of standards, but need a focus on quality assurance of content in the SSM. Reaching critical mass is hindered on the supply side by requiring fragmentation of content and submission processes depending on multiple actors in the Value Network.

Theoretical implications derived from this thesis are the applicability of the model designed by Müller (2005) for SSM analysis, a generic model of a SSM value model, the use of the STOF model as analysis guideline and further research suggestions on matching mechanisms, supply processes in relation to the value network configuration and reputation systems for maximizing market efficiency.

Practical implications for actors in the Value Network are a focus on exclusivity which creates premium pricing opportunities, the adoption of standards to lower efforts for submission processes, redesign of reputation systems and minimization of consumer acquisition effort through increasing payment means.

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1 Introduction

1.1 Case description

With the introduction of the iPhone in 2007 [Apple, 2007] the smartphone industry changed. The iPhone strategy initially was bringing a full mobile internet browsing experience; the strategy renewal for the iPhone was enabling third party software to run on the device, sold on and for the smartphone to increase user value and usefulness [West & Mace, 2010]. Competition quickly announced and developed competing product combinations that match Apple's success with Operation System (OS) specific smartphone software markets [Distimo, 2009].

As content increases rapidly for OS specific application markets [Apple, 2010b, Google, 2010a] with accompanying revenue streams [Apple, 2010c], the smartphone software market battle is a hot research topic for industry and the scientific community. Where traditional Mobile Commerce (M-Commerce) and Electronic Marketplaces (E-Marketplaces) mainly researched consumer appliances on application level and B2B transaction implications [Scornavacca, Barnes & Huff, 2006] there are a few phenomena marginally covered, including the impact on mobile transactions through E-Marketplaces [Standing, Standing & Love, 2010].

This master thesis fills this knowledge gap by researching a Smartphone Software Marketplace (SSM) by placing it in context of electronic market research and analyzing multiple cases using related topics and theoretical models on E-Marketplaces and Business Models.

Convergence of device features and functionality by hardware and software combinations makes researching Smartphones complex [West & Mace, 2010]. Figure 1 shows how SSMs are related to a Smartphone by highlighting the different contextual topics for this research. A SSM is an application to buy more applications that run on a specific Operating System (OS). An OS is a non-physical part of a smartphone which controls hardware, the physical part of a smartphone. The OS is part of the service that is provided by a company selling Smartphones. For this research, all physical aspects related to Smartphones are excluded and the discussion on OS level is limited.

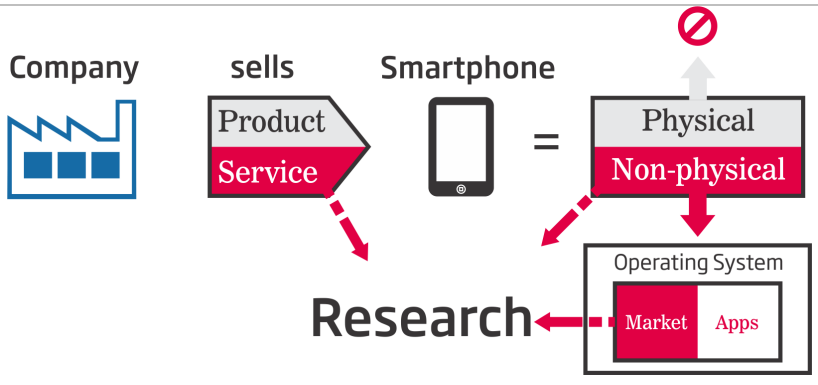

Figure 1: The relation between the smartphone and this research

The high interdependence of physical and non-physical smartphone parts is dissected in figure 2. Each internal or external design aspect is related to a different research domain, for example Computer Science, Industrial Engineering, Industrial Design or Electrical Engineering, which addresses the need of research focus even more.

	Hardware	Operating System	Market	Application
Internal Design	Components	Hardware Interaction	Processes	Function
External Design	Form	User Interaction	Business Model	User Interaction

Figure 2: Smartphone topic teardown complexity overview example for iPhone

This thesis research is limited to the market topic, covering research issues related to the domain of Industrial Engineering for Information Systems. The internal and external design issues related to the smartphone software market are researched; the processes and the business model that form a market configuration for a company. The aim of this research is a discussion and insight about how different business models, value networks and processes together shape a market design that improve or hinder marketplace adoption for suppliers and buyers.

Smartphone software markets offer applications as content coming from specific suppliers: software developers. Current smartphone software markets have a classical chicken-egg problem related to the content that is available. Consumers want appropriate content, developers want to develop applications that sell well. Without consumers, developers are unwilling to develop for a SSM, without content; consumers are not attracted to the SSM. Critical mass of both developers and consumers are necessary for market success [Gallagher & West, 2009].

1.2 Hypothesis

From the previously stated case description, the following hypothesis is derived:

A smartphone software market benefits from a closed market configuration which improves demand and supply adoption leading to critical mass.

As a theoretical model, the hypothesis is shown in figure 3. From the current state of SSM, a theory is derived: four major topics together define a market configuration that influence the demand and supply part of the adoption of a marketplace. This influence is limited to the segment of the content, applications, that is offered in the marketplace. To test this hypothesis, case study research is undertaken on multiple smartphone software marketplaces by reviewing the individual parts that make up a market configuration design.

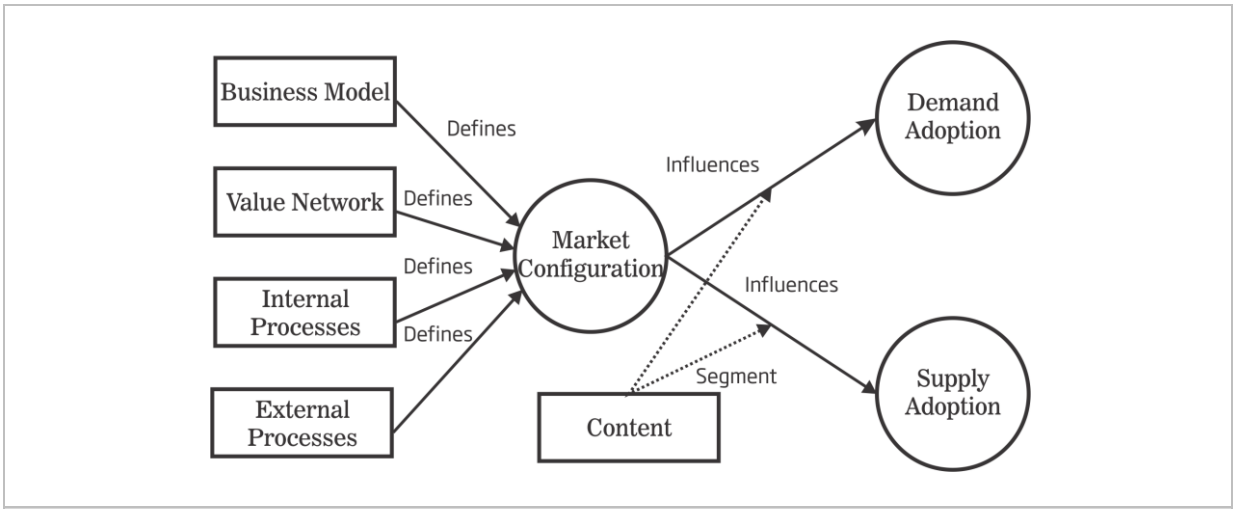

Figure 3: Theoretical model for hypothesis

Figure 4 shows how the value network, business model and processes that define a market configuration are linked to the various viewpoints covered in this research, the company and its environment, SSM as a product and the service that a SSM represents.

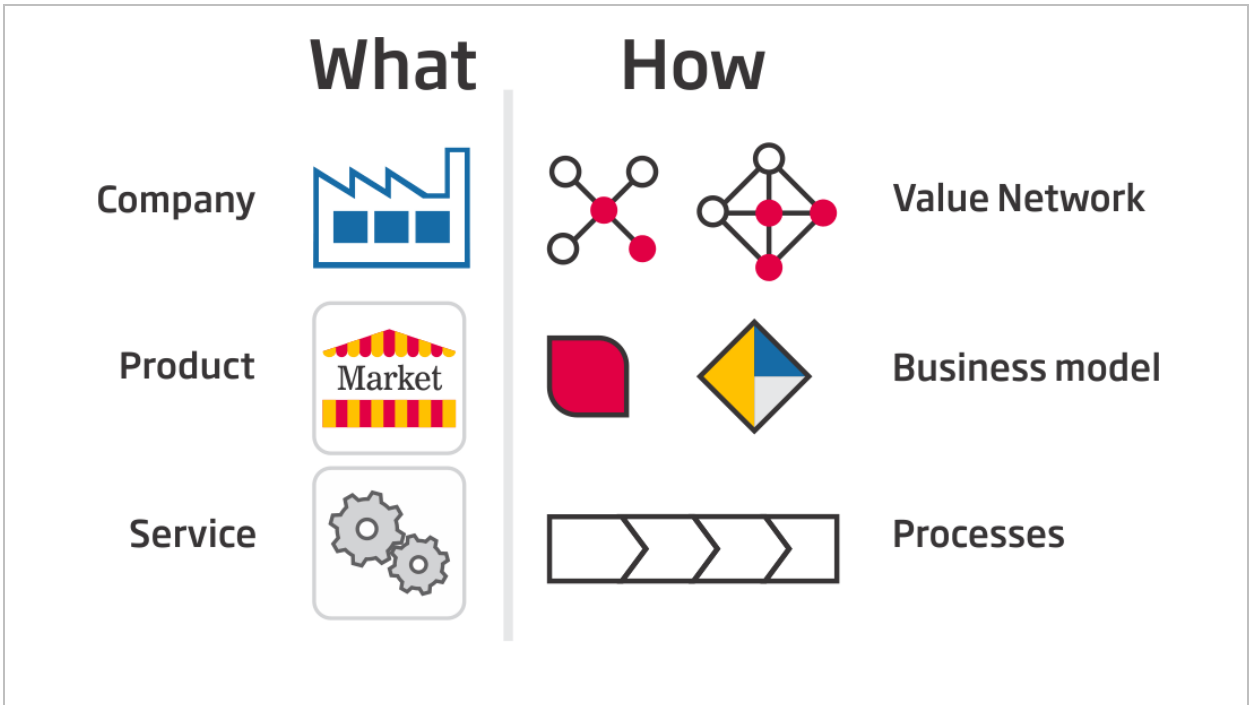

Figure 4: Links between market configuration research topics and real-world representation

1.3 Research Approach

By applying a model for E-marketplaces [Müller, 2005], the configuration of SSMs is established, in relation to the business environment with a focus on processes. How the SSM as a product is placed in context of the company covering one or multiple Value Network actors is defined by the STOF Model leading to a Business Model and service design [Bouwman et al, 2008].

The outline of this research document is presented in figure 5, showing the sequential steps conducted by which the hypothesis of this thesis is researched. SSM research falls in the domain for E-Marketplaces, which is part of Electronic Business (E-Business). In the right part of figure 5, the research domains are presented with some examples of E-Business companies, E-Marketplaces and SSMs.

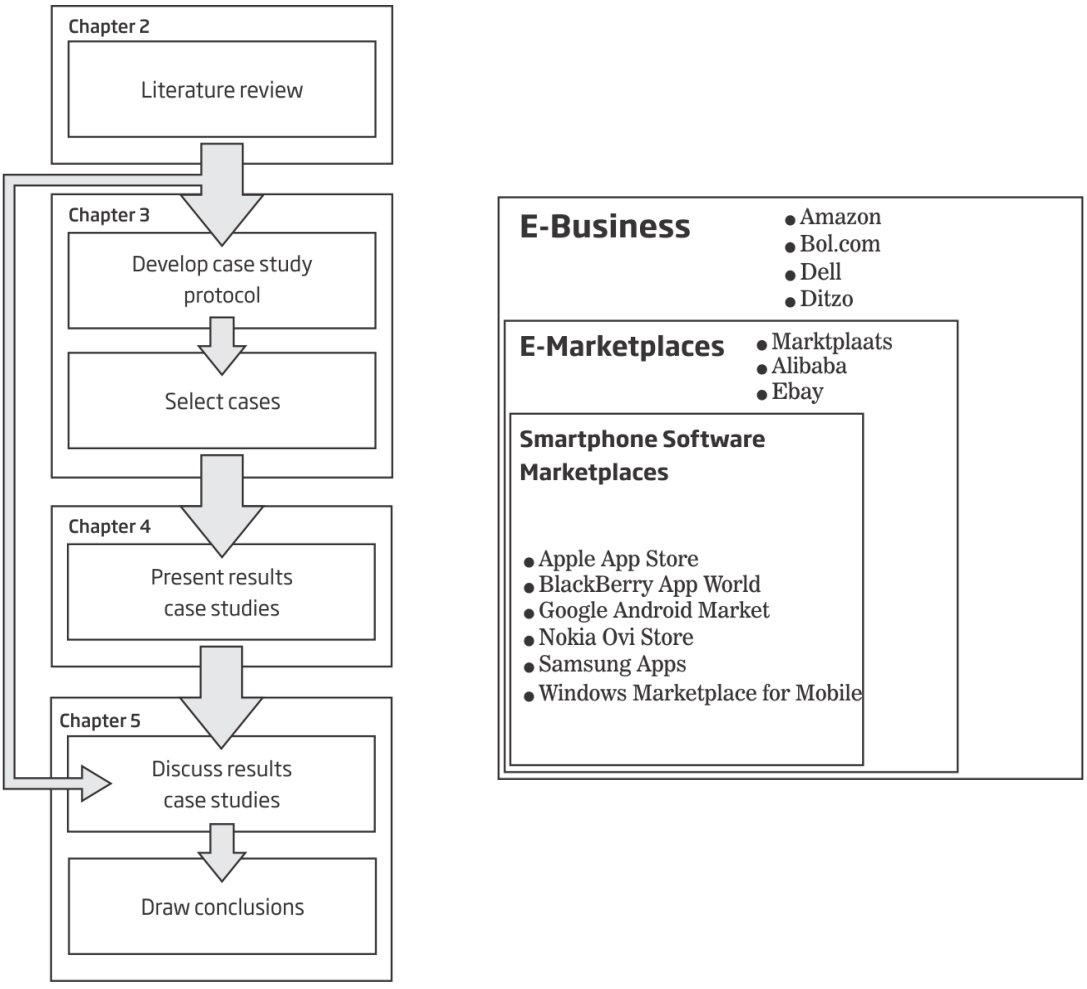

Figure 5: Thesis report outline (left) and research domains (right)

After the model discussion of Müller (2005), E-Marketplaces literature is reviewed in chapter 2 and will be applied in chapter 5 to discuss what the implications of the found data results are. The STOF Model by Bouwman et al. (2008) is discussed to explain the relation of context and Value Network of the SSM Business Model. From the discussed topics, a case study protocol is designed to gather data on different smartphone software

markets in chapter 3. Furthermore, in chapter 3 the set of cases for research is determined.

The case study protocol is then applied in chapter 4 to a set of smartphone software marketplaces. The set of cases to be reviewed are determined by a set of exclusion factors. Multiple current market situations are codified and compared for the competing business models, value network positions the SSM owner represents and the processes handling demand, supply and internal workings. The cross case analysis results of the assembled case study findings give an overview of how marketplaces are configured and reveal the mechanics of competition in demand and supply.

With the cases overview from chapter 4, the configurations are assessed to the implications of literature as discussed in chapter 2. What the findings represent and how these results add to the literature is discussed in chapter 5. The limitations to the interpretations of the results accompanied by managerial and theoretical implications of the findings are presented along with suggestions for further research.

From this introduction on the topic of SSM, the context and proceedings in this thesis report, the analysis presented in chapter 2 discusses the background theories used for analysis.

2 Literature review

In this chapter, three major topics for Smartphone Software Marketplaces are discussed. First, a model is discussed on trading in E-Marketplaces. This model on trading in E-Marketplaces is used as a foundation for analyzing SSMs.

The topic of Electronic Marketplaces then is further defined by a literature review. By conducting a literature review, the current state of the research topic is assessed.

Finally, business models and the respective environment as an eco-system are discussed. The business model is one of the essential parts of a service offering such as a SSM.

2.1 Trading in Electronic Marketplaces

Müller (2005) proposed a model for electronic markets trading knowledge. "The foundation of the model is the economic, social and cultural environment and the characteristics of the knowledge assets." A representation of the model is presented in figure 6.

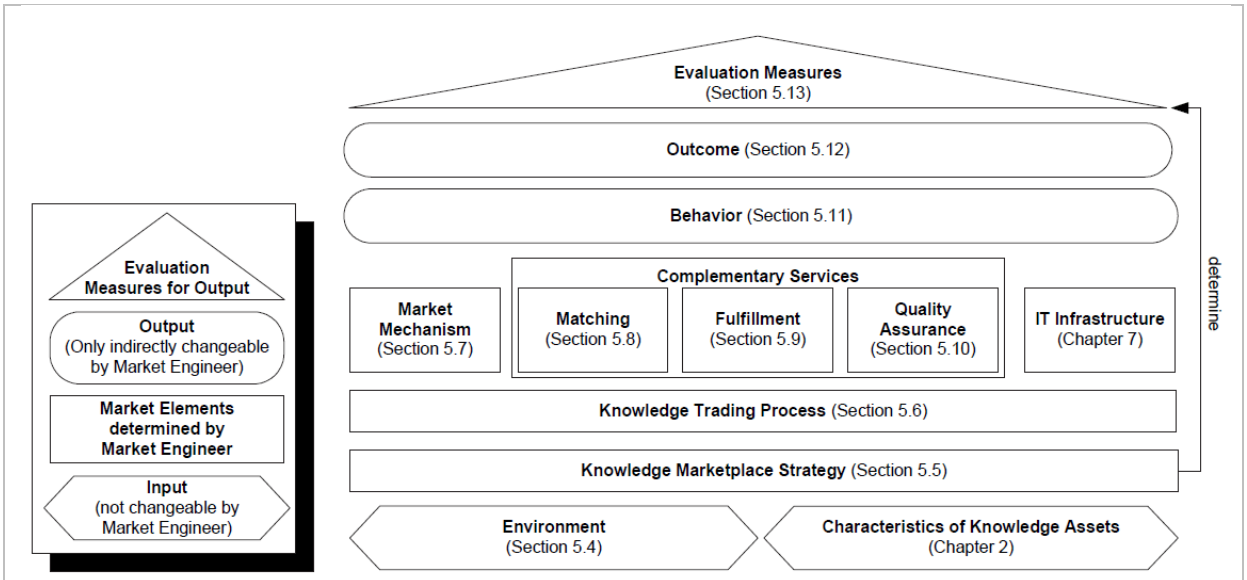

Figure 6: A Model for Electronic Knowledge Markets [Müller, 2005 p122]

"The model elements, which are under the direct control of the market engineer, are the knowledge marketplace strategy, the knowledge trading process, the market mechanism, the matching, fulfillment and quality assurance services as well as the IT infrastructure. These model elements influence the behavior of the market participants and the overall market outcome which can be judged by different evaluation measures" [Müller, 2005].

The model distinguishes three specific groups of actors with the E-Marketplace, the Market Engineer, Advice Seekers or Customers and Expert or Suppliers. How the trading process between the actors takes place is presented in paragraph 2.1.2.

2.1.1 Knowledge Marketplace Strategy

The following section is adapted from Müller (2005, p124-126) to define design choices for knowledge marketplace strategy.

The target group consists of choices for the marketplace dedicated to company markets, closed group of companies, virtual communities and open knowledge markets. Depending on the type of market, a different strategy take is involved in reaching critical mass for the market.

There are three types of knowledge assets distinguished: expert knowledge and digitally documented knowledge or a combination of both. Specific definition of the asset to be traded may be necessary before trade.

Financial models are defined for covering market operational costs and yielding profit: Participation fees, transaction fees, advertising and other services.

The utility of the market for the participants is a function of the number of the participants; therefore network effects exist in E-marketplaces. Before a market becomes self-sustainable, a critical mass of participants on demand and supply side must have to be reached. The number of participants is a significant factor for reaching success with competing E-marketplaces.

The market operator has to decide on multiple market framework elements: the market mechanism, value adding mechanics as matching, fulfillment and quality assurance, and the IT infrastructure for the marketplace.

2.1.2 Knowledge Trading Process

Two processes are defined related to the type of traded good, expert advice or digitally documented knowledge. Since applications for smartphones are similar to digitally documented knowledge, only this model is explained. The model shows interaction between customer and supplier, in a stepwise process listed from (a) through (j), as shown in figure 7.

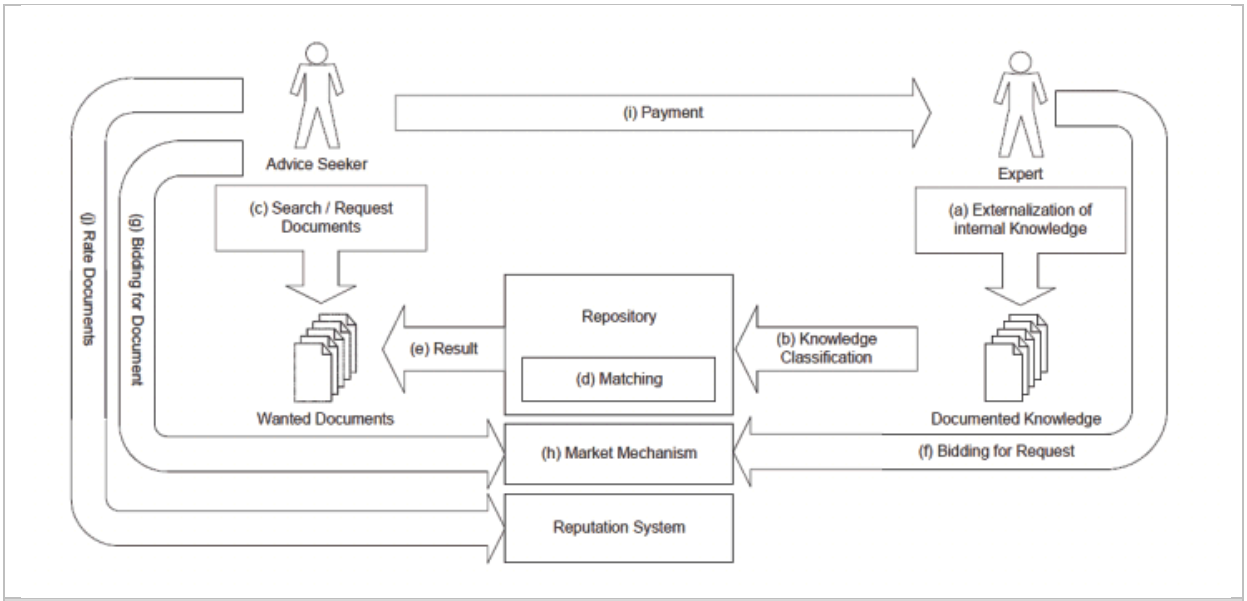

Figure 7: The trading process for digitally documented knowledge assets [Müller, 2005 p128]

"In a market for documented knowledge, the expert must at first codify the knowledge he wants to provide (a). Afterwards he can offer and classify the documents on the Marketplace by means of a knowledge taxonomy (b). The advice seeker is looking or asking for a specific document (c). The matching engine (d) results in a list of appropriate hits (e), on which the advice seeker can place a bid (g). The expert can also bid on advice seekers' requests (f). The market mechanism (h) determines who receives a copy of the document and under what conditions. Subsequently the documents are transferred to the successful buyers. The advice seeker then pays the expert (i) and rates the expert as well as the value of the document, if necessary (j)." [Müller, 2005].

The above described process steps are part of four general transaction phases which are related to the transaction costs that incur with trade. The four phases are information phase, agreement phase, execution phase and after sales phase. In the information phase, search costs are incurred, which can be lowered by matching services. For the agreement phase, negotiations can increase transaction costs, which can be lowered using market mechanisms. The execution phase drives transaction costs by the time consumed between contract and supply, or adoption of knowledge by the consumer. Fulfillment services can aid in lowering these costs. In the after sales phase, costs incur when the transaction is disputed in quality or refunds are needed. Quality assurance systems like reputation systems can lower this type of transaction costs. [Müller, 2005]

2.2 Electronic Marketplaces

Papazoglou & Ribbers (2006, p199) define electronic marketplaces as 'a virtual online market, i.e., a network of company interactions and relationships where buyers, suppliers, distributors and sellers find and exchange information, conduct trade and collaborate with each other via an aggregation of content from multiple suppliers, trading exchange and member communications supported by collaboration tools.'

The result is a trading hub where all interconnections are represented at a single point, with three particular functions:

1. Act as an exchange for business transactions – not only purchase, but also for checking prices and stock availability, invoicing and order chasing
2. Manage catalog content, converting product information into a common format understood by all parties
3. Provide additional services to support the trading process, from shipping, payment and tax, to online auctions, tendering and vetting a company's financial status

[Papazoglou & Ribbers, 2006, p199]:

Another aspect described by Papazoglou & Ribbers (2006) is the chicken-egg principle of thriving electronic marketplaces; it cannot be sustained without a critical mass of buyers and sellers. More suppliers mean more variety and choice which lower search costs for buyers. More buyers mean increased reach, resulting in an increased chance of sales. The greater an installed base of market participants, the greater the value of a specific electronic market [Dhai, 2002 in Papazoglou & Ribbers, 2006, p201].

To assess the current state of literature covering the topic of E-Marketplaces, or Electronic Markets (EM), a structured literature review [Webster &Watson, 2002] is conducted using the following constraints: focus on the top 25 IS Journals, covering the last 5 years of publications [Schwartz & Russo, 2004]. By using a search engine that covers most of the top 25 IS journals, Reuters Thomson – Web of Science, leaves only two journals unsearched; Communications of the AIS and Information & Organizations. The remaining two journals are searched by hand. With backward and forward citation searches, relevant older journal articles will be discovered and added for review if relevant.

To maximize search effort result, a customized query is entered in the search engine. The query is refined by exclusion of topics that render false positives. In table 1 an example of the used query for the Web of Science search engine with aforementioned is presented.

TS=(Ele* AND Market*) NOT TS=(Electricity OR Marketing) AND SO=(MIS Quarterly OR Communications of the ACM OR IS Research Management Science OR IEEE Transactions OR Harvard Business Review OR Decision Sciences OR Decision Support Systems OR Information and Management OR European Journal of Information Systems OR Sloan Management Review OR ACM Transactions OR Data Base OR Organization Science OR Information Systems Journal OR Academy of Management Journal OR Communications of the AIS OR IEEE Computer OR Journal of Strategic IS OR Administrative Science Quarterly OR Academy of Management Review OR International Journal of E-Commerce OR ACM Computing Surveys OR Accounting, Management & IT) AND PY=(2010 OR 2009 OR 2008 OR 2007 OR 2006 OR 2005)
Timespan=All Years. Databases=SCI-EXPANDED, SSCI, A&HCI.

Table 1: Customized search query for structured literature review

The results from the search engine and the hand searched journals are then scrutinized by a predefined set of rules and steps. First, the titles of research papers are reviewed for relevance. A subset of the initial results will pass on to the second review round, selection by reading abstracts. From the resulting subset, the references are checked for missing relevant studies as an extended search. Using forward and backward citation, additional relevant study articles are identified. By reviewing abstracts, the remaining additions are further limited down by relevance. Combining the original search subset and the citation analysis results, a set for a full text review is gathered. After the full text review, relevant literature is used to make the literature review on electronic markets.

The literature review process is depicted in figure 8 with the corresponding numbers relating to accepted and rejected journal papers for inclusion in this literature review. Journal papers are rejected based on multiple selection criteria: availability for review, written language, research domain and research topic.

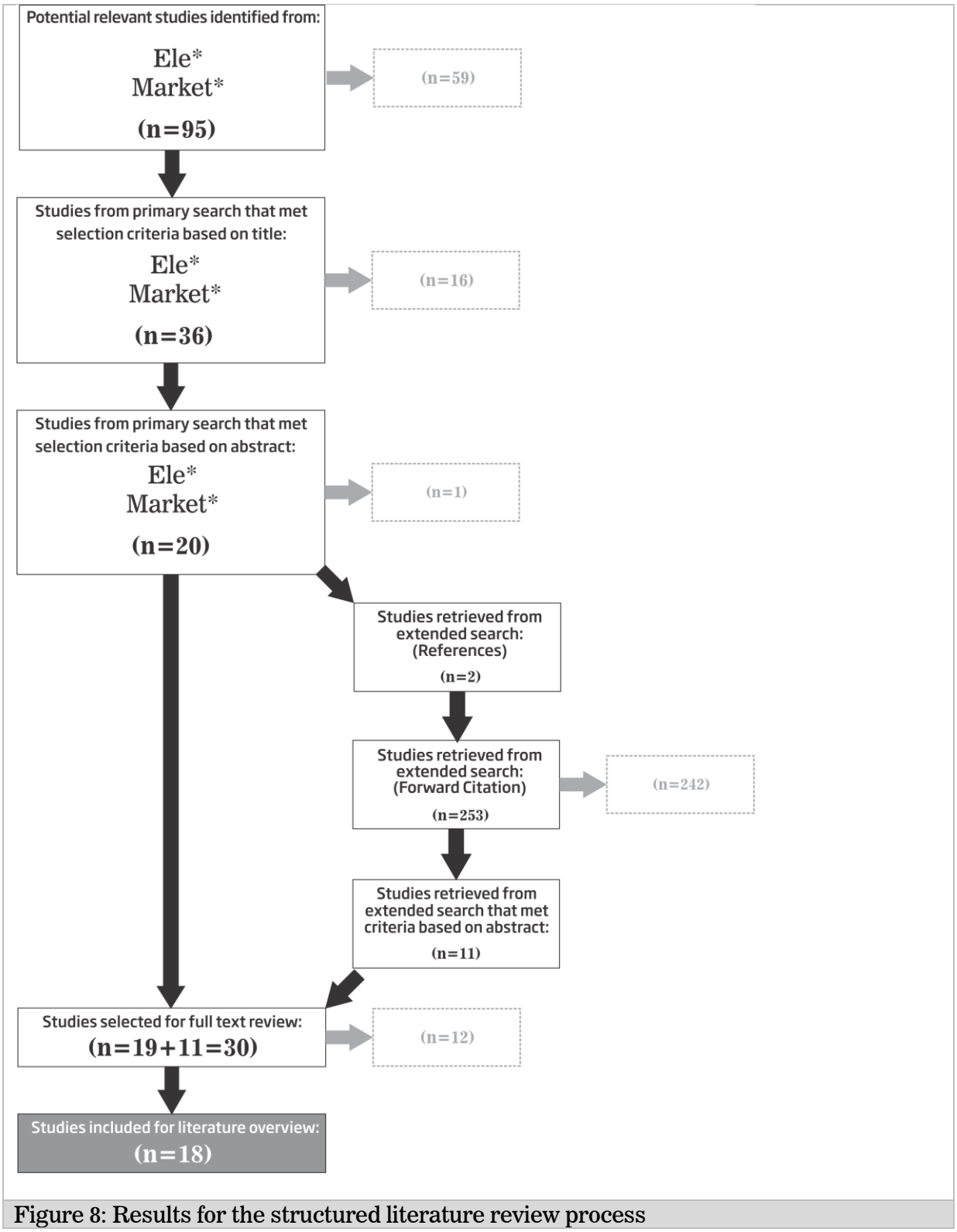

Figure 8: Results for the structured literature review process

From the literature reviewed, multiple concepts emerged from electronic marketplaces literature. An overview of the concepts discussed in the 18 research papers that have been included in this literature review is provided in the concept matrix in table 2.

			Concept														
	Author	Year	Trust	B2B	B2C	Transaction Costs	Pricing	Transparancy	Governance	Efficiencey	Assymmetry	Discovery Mechanism	Products	Network Effects	Segmentation	Relationships	Standards	Research
[1]	Bunduchi	2005	x			x										x		
[2]	Chun & Kim	2005				x	x						x			x		
[3]	Granados et al.	2010		x	x			x			x							
[4]	Grewal et al.	2010	x	x			x		x							x		
[5]	Grover et al.	2006			x	x	x			x		x						
[6]	Jaffee & Russell	1976		x	x		x	x			x					x		
[7]	Kumar & Lang	2007			x			x				x	x		x			
[8]	Li et al.	2010		x	x	x			x					x	x			
[9]	Mudambi & Schuff	2010			x	x		x		x		x	x					
[10]	Phang et al.	2010			x							x			x			
[11]	Sankaranarayanan & Sundararajan	2010	x	x		x				x						x		
[12]	Scornavacca et al.	2006																x
[13]	Standing et al.	2010							x	x							x	x
[14]	Sun & Liu	2010			x		x					x		x		x		
[15]	Yankelovich & Meer	2006			x							x			x			
[16]	Zhao et al.	2009	x	x					x					x		x	x	
[17]	Zhou et al.	2008	x	x	x		x				x	x				x	x	
[18]	Zhu et al.	2006	x			x								x		x	x	

Table 2: Concept matrix of 18 retrieved and reviewed research papers

There are two papers [Scornavacca, Barnes & Huff, 2006; Standing, Standing & Love, 2010] that discuss the state of research efforts about electronic markets in a literature review, which form categorization in this review as part of the master thesis.

Scornavacca, Barnes & Huff (2006) did the first assessment of the state of mobile business research related to E-Marketplaces. Their assumption that mobile electronic commerce research was mainly descriptive and lacked empirical investigations was proven right. The further research suggestions points out that business and organizational issues, empirical research and theory development are necessary. A reason for overcoming this research gap, according to Scornavacca, Barnes & Huff, is the increased interest by researchers in this field, as prior research into e-business has shown.

Seminal work has been delivered by Standing, Standing & Love (2010) covering electronic market research from 1997 to 2008. The result is a conceptual classification of electronic marketplace literature, depicted in figure 9. The focus on the market, system or organization is related to the level of theoretical emphasis and gives insight in what to expect from researches conducted by the literature that is reviewed. For each focus group, different research issues have been determined by Standing, Standing & Love (2010). Five high-level conceptual categories are identifiable, each broken down into specific topics. The relations between the five categories are also represented in figure 9.

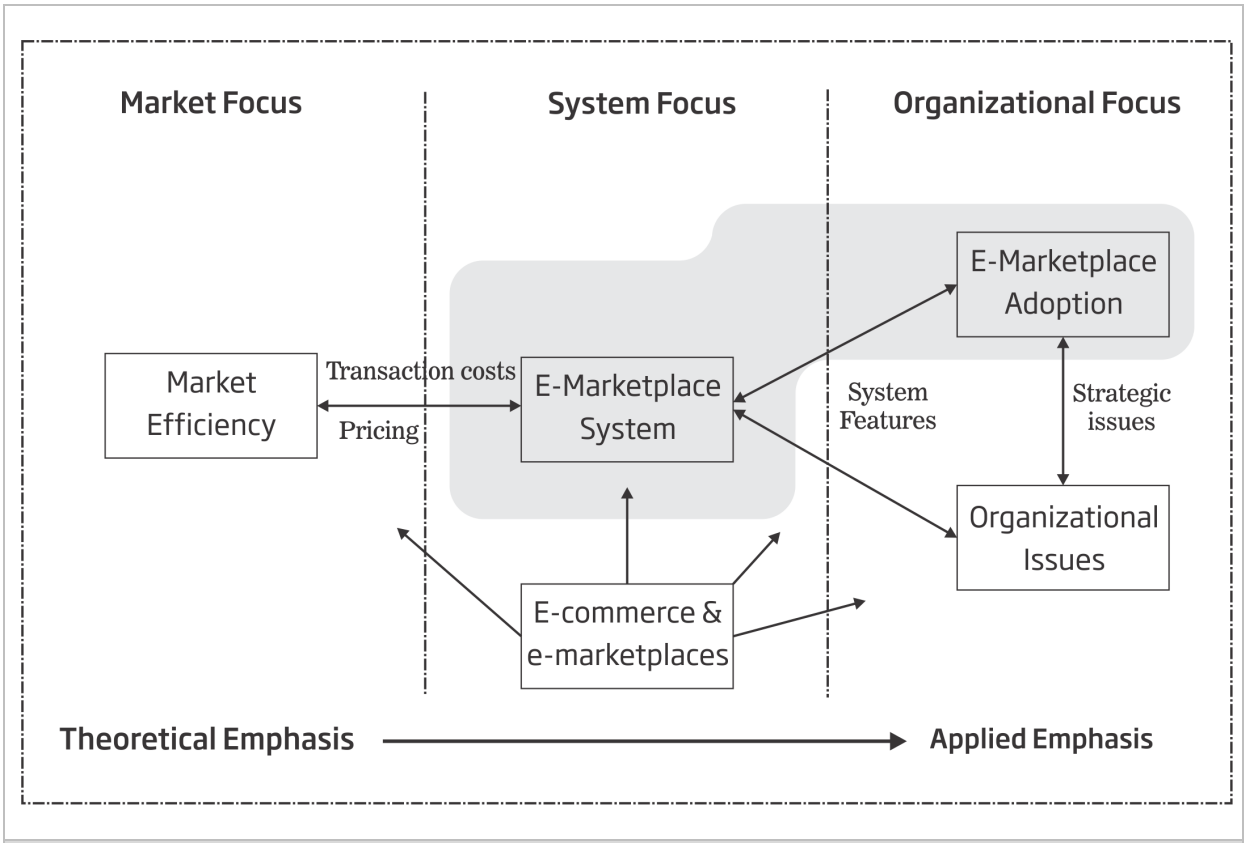

Figure 9: Research focus for Smartphone Software Markets within electronic marketplace literature [Adapted from Standing, Standing & Love, 2010]

The five main research categories that have been identified by Standing, Standing & Love (2010) left out auctioning mechanisms. For this master thesis, this will also be the case as there are not yet any SSMs with auction mechanisms available. However, some research on electronic auction marketplaces cover reputation systems which will be included, as reputation systems are found in SSM and are modeled in the model by Müller (2005).

The research papers as presented in table 2 have been categorized according to the five categories and topics of Standing, Standing & Love (2010) in table 3. From the categorization overview it is shown that literature research can cover multiple categories. The multiple occurrences are due to research focus that is more related to other main themes in electronic business literature.

Category	Topics	Paper(s)
Market (Efficiency)	Efficiency	[5], [9]
	Pricing	[2], [4], [5], [6], [14], [17]
	Search costs	[1], [2], [3], [5], [6], [7], [8], [9], [14], [17], [18]
	Product	[2], [3], [7], [9]
	Structure	[8], [16], [17], [18]
	Operational performance	-
E-Marketplace Adoption	Adoption approaches	[11]
	Adoption in the supply chain	[16]
	Barriers and motivation	[7], [10], [14], [15]
E-Marketplace System & Technology	Business models	[8]
	Trading mechanisms	[3], [5], [7], [8], [9], [10], [15], [17]
	Knowledge management systems	-
Organizational issues	Strategy	[3], [4], [5], [6], [8], [16], [17]
	Relationships & Networks	[1], [2], [4], [6], [8], [14], [16], [17]
	Trust	[1], [4], [11], [16], [17]
E-commerce & e-marketplaces	General	[4], [5], [12], [13]

Table 3: Category matrix of the 18 reviewed research papers

The most represented topics of table 3 also are the relations between the categories as presented in figure 9, giving an indication that the proposed conceptual classification holds for smartphone software market research. The other conclusion from this overview corresponds to the statement that "there are many factors that increase the complexity of electronic markets" for general electronic markets theory [Standing, Standing & Love, 2010, p44]

Derived from the model in paragraph 2.1, the thesis is mainly targeted towards the System Focus category which results in qualitative outcomes towards the Organizational Focus category with respect to E-Marketplace Adoption. To reduce complexity, Organizational Issues are not further covered in this literature review. The discussion on topics regarding Market efficiency (§2.1.1), E-Marketplace Adoption (§2.1.2) and E-Marketplace System (§2.1.3) are presented below. Each category topic presents relevant findings from Standing, Standing & Love (2010) and furthermore covers the findings of the retrieved literature from the literature review.

2.2.1 Market efficiency

Efficiency

According to Standing, Standing & Love (2010), efficiency is measured in many forms. Matchmaking algorithms for buyers & sellers, transaction costs and information asymmetry are the main issues. Grover, Lim & Ayyagari (2006) show that market efficiency in relation to price is subject to dispersion even though information asymmetry is lowered through the use of matchmaking tools. There is a risk of information overload leading to price dispersion for similar product offerings. Related to the information

overload and matchmaking tools are the results by Mudambi & Schuff (2010), stating that reviews are helpful for consumers. Reviews that are moderate and explicit are the most helpful, with distinction that this effect is greater for search goods than experience goods, where search goods are easy to compare on attributes in contrast to personal experiences.

Pricing

The price paid for a good in an e-marketplace is only one variable in the purchase decision [Standing, Standing & Love, 2010]. From the research results by Chun & Kim (2005) is concluded that digital goods have lower consumer transaction costs, but are priced higher in electronic markets than in physical stores.

Consumer community building in static pricing marketplaces is higher, this allows for the seller reputation to add to the transaction value, creating a need for reputation mechanism [Grewal, Chakravarty & Saini, 2010]. For Taiwanese online auctions, seller reputation mechanisms are effective in mitigating information asymmetry which affects prices positively for sellers [Sun & Liu, 2008]. Starting auction suppliers have difficulty with gaining a good reputation in reputation mechanisms, which decreases consumer prices. To increase online seller reputation, sellers are pushed to lower their prices, this price reduction increases setup costs for starting suppliers [Zhou, Dresner & Windle, 2008].

Search Costs

The costs for consumers to find desired products decrease with electronic marketplaces [Bundichi, 2005, Chun & Kim, 2005, Grover, Lim & Ayyagari, 2006, Kumar & Lang, 2007, Li, Liu & Bandyopadhyay, 2010] in two ways: (i) reducing the cost of acquiring generic published information, and (ii) facilitating faster and less costly communication of specific information [Sankaranarayanan & Sundararajan, 2010]. Furthermore, price monitoring through seller information transparency works two ways and therefore allows for sellers to influence their competitive position by price differentiation [Granada, Gupta & Kaufmann, 2010, Standing, Standing & Love, 2010].

Product

Electronic Marketplace literature on product is based on the design of the market offering processes, which still lacks substantial research [Standing, Standing & Love, 2010].

Structure

Research on the topic of market structure shows that there is an influence by two features: information transparency and product design strategies [Standing, Standing & Love, 2010]. Differentiating structural design by focus on switching costs for buyers allows for higher pricing for sellers in the market [Li, Liu & Bandyopadhyay, 2010]. Market structural design influences market success by the focus of a neutral, buyer or seller design. Seller focus drives seller revenues, which increases differentiation by product quality. Buyer focused marketplaces cause decreased seller prices and are therefore more likely to fail. Neutral markets have benefits when mimicking prior existing exchange networks [Zhai et al., 2009]. Although reputation systems for auction marketplaces are useful, improving the design to encourage transaction partners to use the system effectively is a necessity for market reinforcement [Zhou, Dresner & Windle, 2008].

Operational performance

The work by Standing, Standing & Love (2010) discusses articles on operational performance in the supply chain in respect to marketplaces that trade and aid in acquisition of tangible goods. The findings are not applicable for this thesis.

2.2.2 Market Adoption

Adoption approaches

The most covered topics for tangible goods are the selection of electronic marketplaces to work with, next to the implementation phases definition. Early adoption benefits of electronic markets are increased profit and market share due to sellers' cost reduction and better buyer preference information along with price differentiation possibilities [Standing, Standing & Love, 2010].

Sankaranarayanan & Sundararajan (2010) researched electronic markets preference over outsourcing in firms. Their findings state that the nature of the information technology and business activities supported by the inter-organizational systems determines the induced changes which influence the success of adoption.

Adoption in the supply chain

In relation to adoption in B2B electronic markets, the research findings by Zhai et al. (2009) implicate that connection costs to the market should be kept low enough to attract participants. Furthermore, ownership structures, market competition and previous buyer-seller connections affect the sustainability of B2B electronic markets. Other research shows focus on cost reduction, dynamic pricing of content and in-market competitor privacy [Standing, Standing & Love, 2010].

Barriers and motivation

System integration problems, differences in expected and realized benefits of adoption, technological compatibility and operational capacity have been identified as barriers to adoption in B2B systems [Standing, Standing & Love, 2010].

B2C systems benefit in adoption from mechanics that lower information asymmetry therefore decreasing transaction costs [Kumar & Lang, 2007, Phang et al., 2010]. A further benefit is segmentation by customer differentiation which increases profitability for sellers [Yankelovich & Meer, 2006].

2.2.3 Systems & Technology

Business Models

Standing, Standing & Love (2010) "include business models under 'system' rather than organizational issues as their focus is the e-marketplace structure rather than the organizational implications of the structures." Further notes are on comparisons of extranet versus e-marketplace and private trade offerings versus public trade offerings for B2B business trade. Private trade offerings allow existing trust relationships to continue.

Li, Liu & Banyopadhyay (2010) investigated the business model of online marketplaces that are two-sided, where the marketplace owner is an intermediary for demand and supply with revenues for the market owner coming from fees paid by suppliers. Their findings present that market owner investment focus should be less on getting more suppliers, which might lower the profits of the platform, but more on differentiation from rival platforms to let suppliers charge higher prices, increasing platform profits.

Trading Mechanisms

"Trading and transaction mechanisms are given significant coverage in the literature. It has been proposed that the negotiation part of an e-marketplace transaction can be automated." Furthermore, a focus is posed on search processes and relevant factors that influence transactions: supplier management, idiosyncratic investments in information systems, codifiability of products and order fulfillment specifications of the transactions [Standing, Standing & Love, 2010].

Granados, Gupta & Kaufmann (2010) research shows that information about products in B2C e-marketplaces is trivial and increase of information sharing can be achieved by defining a transparency strategy on company level that addresses systems design. If applied, the information transparency in the system has a positive impact on consumer spending behavior.

Grover, Lim & Ayyagari (2006) found that information overload and information equivocality cause price dispersion and therefore the traditional search-cost perspective is not fulfilling. As growing e-marketplaces allow less experienced suppliers to enter the system, overload and equivocality will increase, reducing the efficiency of the market.

Kumar & Lang (2007) investigated in information search processes the interdependence of clustering and under-specification of search terms. Search engines supporting clustering technology compensate for poor search term specifications which reduces search costs. Consumer search behavior is not uniform and therefore needs system improvements for higher e-marketplace efficiency.

Mudambi & Schuff (2010) discovered that the nature of a good (search, is easily comparable or experience, which is hard to compare) affects information search and evaluation by consumers of Amazon.com with reviews and ratings. Furthermore, the nature of a good moderates the effect of review extremity and depth on the helpfulness of a review. Review extremity and review length have differing effects on the information diagnosticity. Extreme reviews with extreme ratings are less helpful than moderate reviews with moderate ratings, with extremely negative reviews being the least helpful.

Phang, Kankanhalli, Ramakrishnan & Raman (2010) found an answer to ambiguous findings in literature covering customer targeting through demographic segmentation. Instead of using broad demographic segmentation, combinations are better explaining variations of shopping behavior of customers. Furthermore the findings result in focus on robust profiling techniques and unobtrusive clickstream data collection for learning about customer motivation on searching and consumption.

Yankelovich & Meer (2006) use market segmentation as a topic that needs better focus in electronic marketplace marketing. Their research findings present a clear distinction for segmentation driven for advertising versus new product development. By understanding what customer does prefer what product, it drives sales by more satisfied customers.

Zhou, Dresner & Windle (2008) cover online reputation systems and find that electronic marketplaces can benefit from reputation systems that measure seller quality. The effect that honest sellers with quality products are driven out of the market by dishonest sellers with low quality products has been verified. To increase effectiveness of the reputation system, protection against corrupting the system has to be undertaken.

Knowledge management systems

Standing, Standing & Love (2010) conclude that literature on e-marketplace systems in case of knowledge management transfer systems is under represented.

2.3 Business Models & Ecosystems

As a conclusive definition Peltoniemi & Vuori (2004) "consider a business ecosystem to be a dynamic structure which consists of an interconnected population of organizations. These organizations can be small firms, large corporations, universities, research centers, public sector organizations, and other parties which influence the system." The ecosystem is used for creating insight in complex adaptive business environments.

As discussed in section 2.2.3.1, the business model is part of the system that is created for the E-Marketplace. "The business model addresses the creation of value via service innovation and the capturing of a portion of that value by mediating between customer needs, organizational resources and capabilities, financial arrangements and technological possibilities" [Chesbrough & Rosenbloom, 2002 in Bouwman et al. 2008, p29].

The STOF model provides the insight in value creation in the complex relationship structure of marketplace actors [Bouwman et al, 2008, p32], using four core components for design: Service, Technology, Organization and Finance. A representation of the STOF business model domains is represented in figure 10, where the arrows between domains are linkages of interdependence and interaction for design.

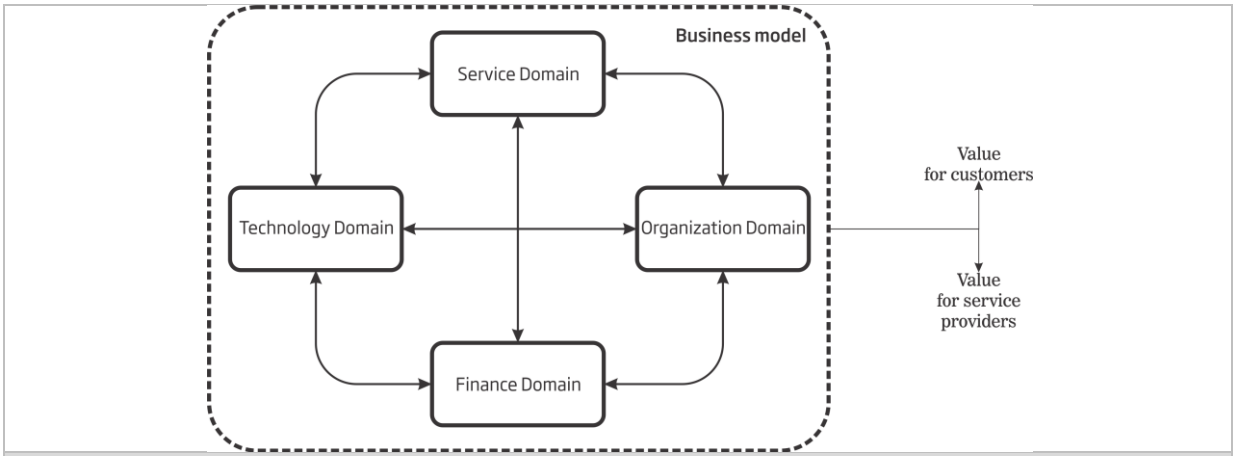

Figure 10: STOF business model domains [Bouwman et al., 2008]

The four model domains comprise concepts that are interrelated, as depicted in figures 11 through 14. In the figures, a square with a letter inside a box shows to what part of the other domain the relation concept is connected to. The figures formulate the complexity of the topic relations and concepts.

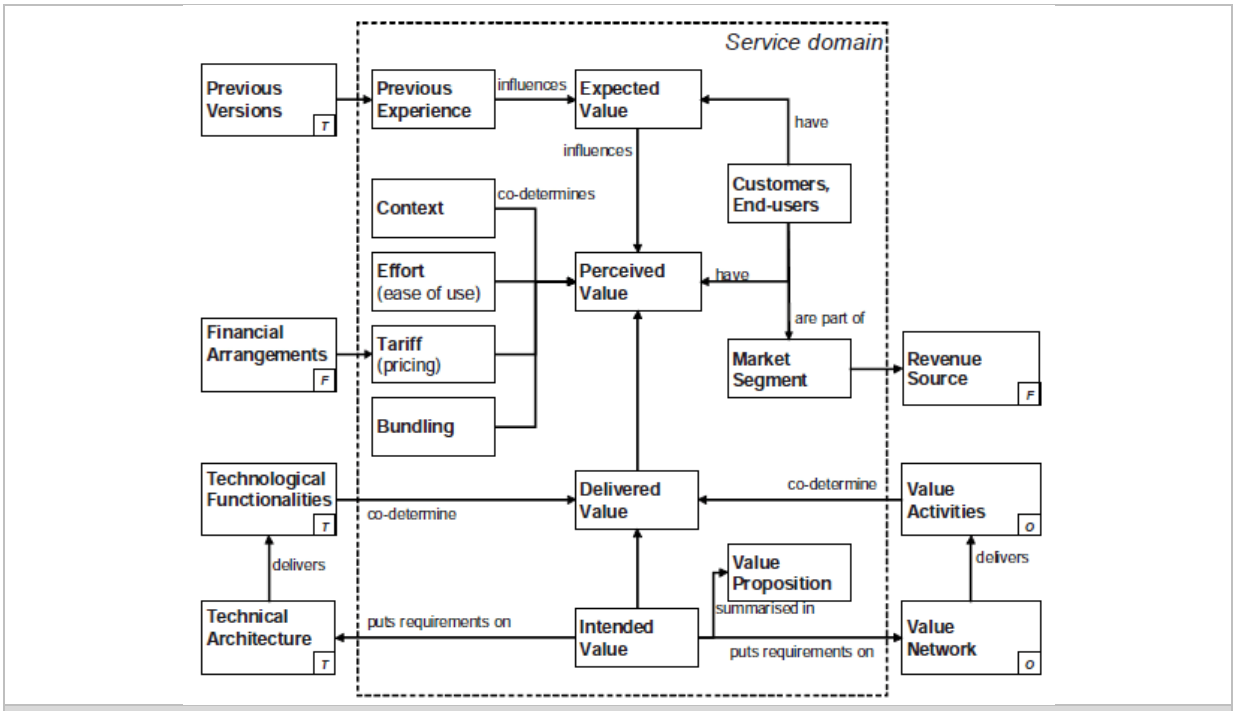

Figure 11: Service Domain [Bouwman et al., 2008 p45]

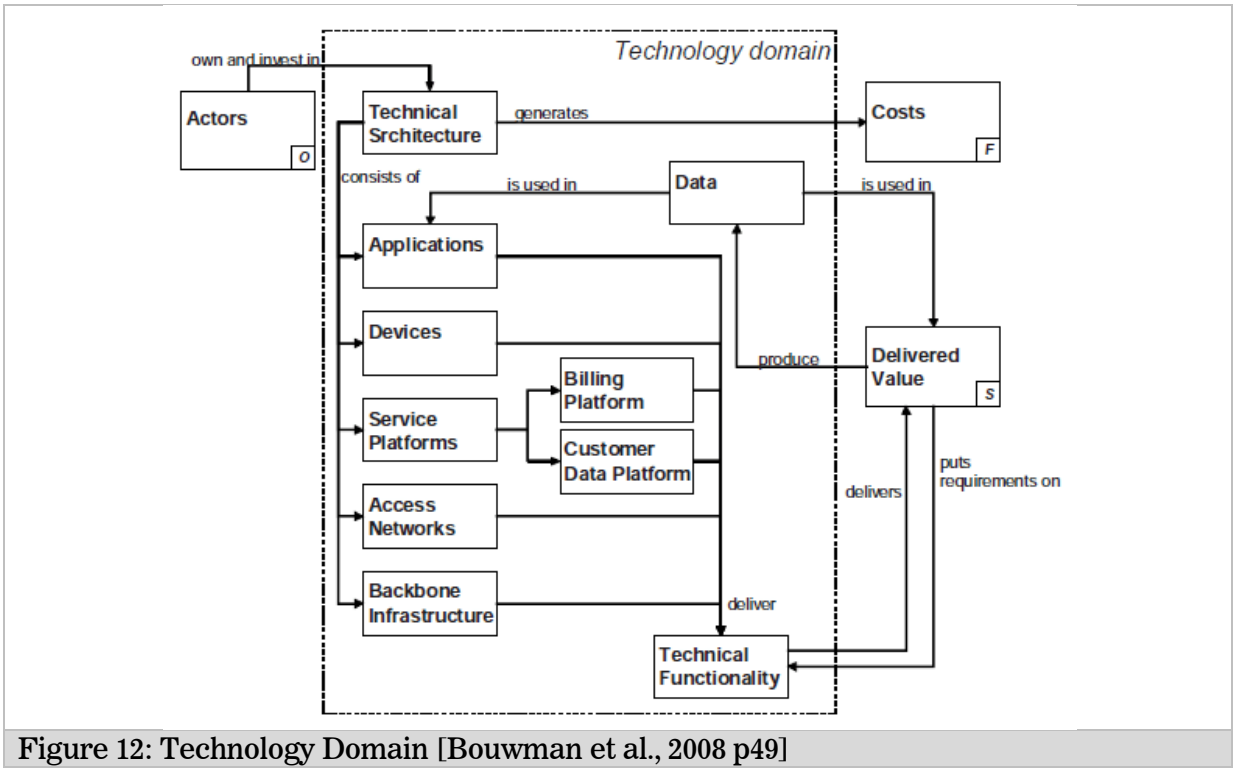

Figure 12: Technology Domain [Bouwman et al., 2008 p49]

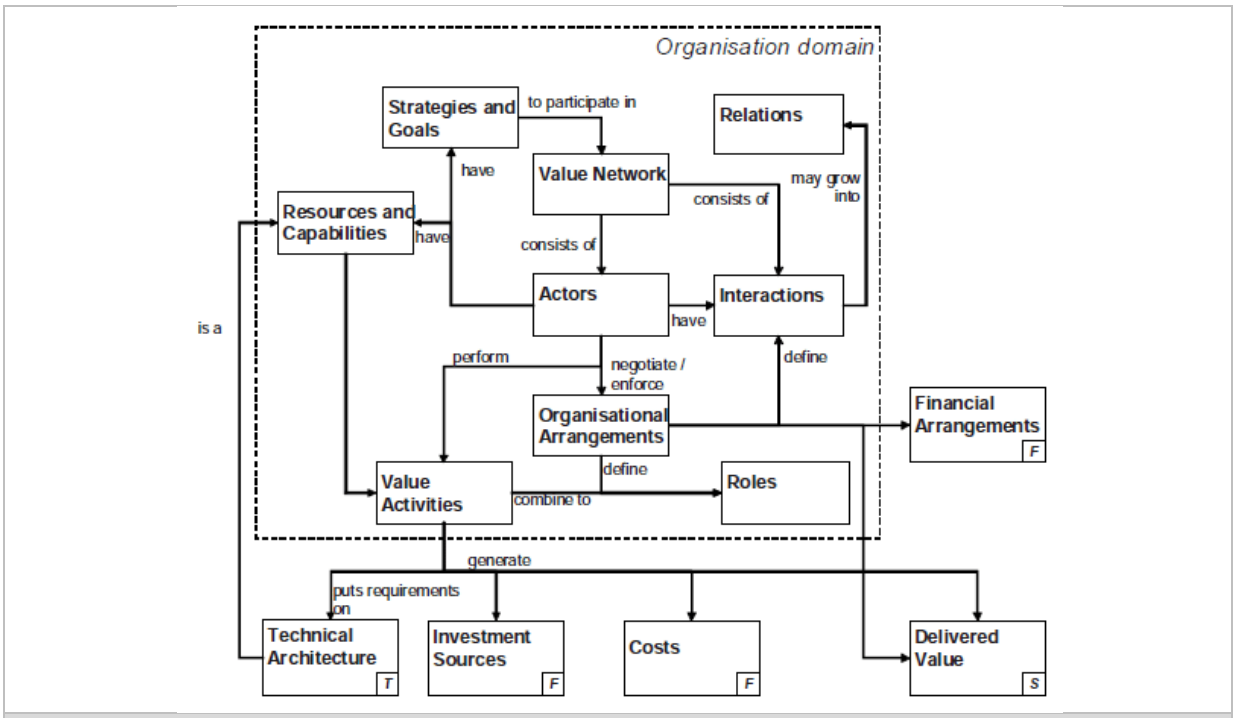

Figure 13: Organizational Domain [Bouwman et al., 2008 p57]

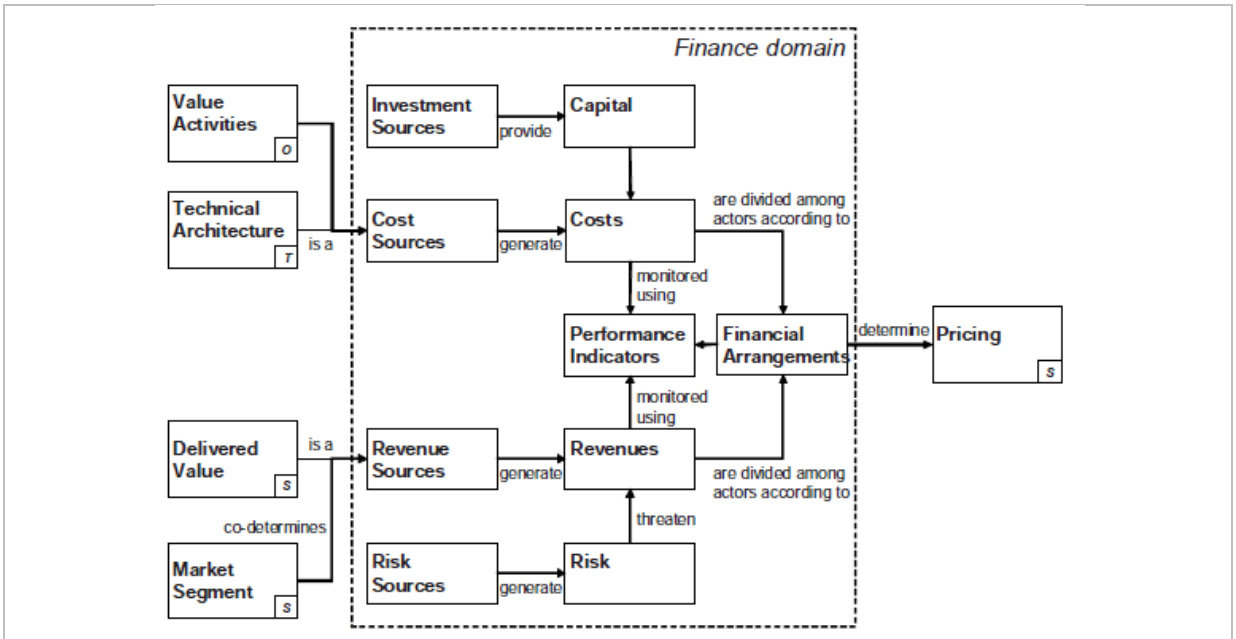

Figure 14: Finance Domain [Bouwman et al., 2008 p63]

Using the STOF model framework for business modeling in service design, the missing dynamic design issues related to traditional business model research is assured [Kijl, et al, 2005]. The STOF model allows for extensive anchoring of complex multi-actor component requirements in design, especially for application in mobile services. An example of such components is used in research by Haaker et al (2007):

- Customers or End users: the consumer segment consuming the service
- Products or Offering: a product that is consumed

- Earnings logic: revenues of the product transaction
- Resources: necessary actors and goods to consume the product
- Suppliers or Actors: organizations necessary for the consumption or preparation of the product
- Organization: the arrangement of actors and resources for the consumption of the product
- Processes: the sequential description of primary business processing components to consume the goods.

The described component interrelations have been used for assessment of key challenges regarding viable mobile services. The results are related to the four domains in the STOF model, presented in table 4 [Haaker et al. 2007].

Service Domain	Technology domain	Organization domain	Financial Domain
Compelling product offering	Integrating emerging platforms	Division of roles in a complex value network	Combining multiple revenue models
Privacy assurance			
Creating trust			

Table 4: Key challenges related to the four STOF model domains [Haaker et al., 2007]

The design consideration in the use of the STOF Model can be derived from an application in the IT & Healthcare research where a value network and business model for a telerehabilitation service design is used [Kijl & Nieuwenhuis, 2010]. Value networks are a interactions between actors transferring value. To systematically capture the value network for analysis, a representation model can be applied: E3 value modeling, which represents the value network through the interacting processes of actors and value exchange from start to end [Gordijn & Akkermans, 2001].

Open business models are discussed by Chesbrough (2007), where open is defined as companies not hoarding innovations turning into waste, but sharing innovations and leverage multi-company assets to drive revenue. The reasons for such a move are mainly economic; expenses on patenting which are wasted 75-95% of the time, rising production costs and shorter lifespan of products to win back the investments. By switching to the business model of open innovation, internal and external development costs are reduced whereas revenues can be expected to rise in three new ways: selling licenses, participation in spinoff companies and direct sales of the product.

Chesbrough (2009) concludes that business model innovation is important but difficult to achieve. Tools such as maps are helpful, but not enough, challenging the change for innovation. Organizational processes must also change, and these are not mapped by tools. Opportunities can be found in identification of change leaders within companies to find way to embrace a new model, and steer away from rigidness by organizational structure in change processes.

2.4 Conclusion

2.4.1 Trading in Electronic Marketplaces

By applying the model by Müller (2005), the SSM as a product for a market engineer can be assessed and differences in approaches between competitors compared. The environment and market processes are determining the configuration of a SSM focused on a key element: critical mass for demand and supply. Network effects are applicable for supply and demand, making the design of processes that enable demand and supply adoption very important.

2.4.2 Electronic Markets

"Although considerable research has been conducted on the technical features of e-marketplaces there are some areas that appear under researched. Areas with research potential that require further investigation include mobile access to e-marketplaces, usability of E-marketplace systems and future technical and system developments" [Standing, Standing & Love, 2010]. This quote shows that SSM research is a requested topic for analysis. The overview that has been given shows not only that the topic of SSM is in the first stages of research, but also highly complex because of the interplay on multiple levels.

The nature of the traded good, the mechanisms of discovery or search and reputation systems is highly debated. Closely related to these topics are the implications for demand and supply, the quality of the product, competition and pricing of products.

In regard to the model discussed in section 2.1, we learn that in current E-Marketplace designs the negotiation phase can be automated. By applying the E-Marketplace trade model, one of the topics that were under researched will be covered: the marketplace as a product.

2.4.3 Business Models & Ecosystems

To reduce complexity in research, the nature of the ecological environment is assessed using Value Networks. To capture the Value Network, E3 value modeling can be applied, which shows relations and trade between actors in the environment.

The Value Network and actors play a central role in the organizational domain of the STOF model. The impact on interactions between actors and organizational arrangements is essential in the application of the model by Müller (2005). The use of the STOF model is verified for application in the mobile domain by Haaker et al. (2007).

3 Research Design

In this chapter, the literature discussed in chapter 2 is applied to the SSM research. First, the applicability of the Electronic Knowledge Market model by Müller (2005) is discussed. Secondly, the Value Network and Business Model research position are presented. Finally, a case study design is presented and a protocol is described for analysis. Furthermore, cases are selected for research using inclusion criteria.

3.1 Electronic Knowledge Markets

The model of Müller (2005) can be applied for SSM because many products in each market, such as dictionaries, travel guides or expert tools which are forms of knowledge goods. This category of software applications is also named utilitarian, in opposition of hedonic software applications such as games [Hirschmann & Holbrook, 1982]. Hedonic software is typically not producing value other than the experience for the user and in contrast, utilitarian software can produce value for the user [Van der Heijden, 2004]. Business Models are descriptions how value for users is created by services or products and how revenue is created for the participating supply and mediation actors in the model.

The description of the model by Müller (2005) matches with the thesis proposal in section 1.3, where the market configuration is determined by the elements of a business model, value network and processes, influence demand and supply adoption. To further link the hypothesis to the used model, the separate parts of the model under direct control of the market engineer are discussed and tuned to SSM.

3.1.1 Knowledge Marketplace strategy

In this section, the knowledge market strategy is applied for Smartphone Software Marketplaces, with special regard of the content in the SSM.

Target group

The target group is the owner of a smartphone with a distinct operating system capable of consuming the applications or content sold in the market. The marketplace is public in fashion and depends on transaction fees. Supply and demand is independent of each other. The marketplace is restricted to a specific group of participants: registered consumers and suppliers.

Knowledge Asset Selection

The Smartphone Software Marketplace trades in applications, which can be regarded as digitally documented knowledge. An example of such a product is a Travel Guide or Dictionary.

Financial Model

For SSM, the financial model consists of a transaction fee that is a fixed percentage of the sales price, if a product has a price. There can also be sponsored or free products available in a market, driven by advertisements, donations, shareware, demo software or completely free of charge.

Critical Mass

Critical mass is essential for successful SSM adoption. Because of the recent deployment of the marketplaces, critical mass may not yet have been reached. Critical mass is necessary to be reached on both ends of two-sided networks, which is applicable for Smartphone Software Marketplaces.

Market Engineer Decisions

The market mechanism is static pricing for all current SSM. Matching systems to match demand and supply are a factor where the engineer can differentiate to improve competitiveness. Quality assurance systems need further analysis, in regard of software quality, value of the product and asymmetry of information.

3.1.2 Knowledge Trading Process

Applications in SSM resemble documented knowledge assets. Therefore, the process description will be applied as described in section 2.1.2 and when necessary, adapted to the SSM situation.

3.2 Business Models and Ecosystems

The STOF model by Bouwman et al. (2008) is used to identify where the topics covered by E-Marketplace literature are linked to each other. This step is necessary to keep an overview, because of the complexity of the research area as discussed by Standing, Standing & Love (2010).

The ecosystem as discussed by Peltoniemi & Vuori (2004) is captured for analysis by defining the general SSM value network. Then, the specific market engineer roles in the value network are assessed with the impact of topics as represented in the organizational domain of the STOF model.

Discussing the openness of the business model in the specific value network composition as presented by Chesbrough (2007) creates an insight how different SSM owners compete and what the impact for the supply and demand side of the SSM is.

3.3 Case study design

In chapter 1, the hypothesis of this master thesis is shown in a model, figure 3. To test the relationships in this model influencing demand and supply adoption, multiple cases are studied and compared. Case studies are advised to analyze contemporary phenomena, taking into account the rich qualitative intricacies displayed [Yin, 2003]. Although there are multiple challenges for case study research related to business networks (the boundary to the network, handling the complexity of the results, taking into account time as a moderating factor, comparing unique formed cases) [Halinen & Tornroos, 2005], the case study protocol [Yin, 2003] and E3 value network modeling technique [Gordijn & Akkermans, 2001]are used to overcome these challenges.

3.3.1 Case Study Protocol

A case study protocol is necessary to conduct the research on multiple cases in a consistent way. Case study selection criteria are used to identify or dismiss cases for

analysis inclusion. Case study questions specified for SSM research represent the information that is going to be collected and the sources that are used for retrieving the information. The field procedures describe the way of collecting information for analysis. With the analysis of data, the method used for analyzing the data is described.

Case Study Selection

The unit of analysis has been established in chapter 1; Smartphone Software Markets. An overview of software application markets is given by Distimo (2010), a company that researches application market content. In March of 2010, 31 marketplaces were announced of which 28 are active.

For the unit of analysis, two markets are excluded from this overview: Intel "AppUp" and Google "Chrome Web Store". The content for these marketplaces is not applicable for smartphones. Furthermore, smartphone marketplaces are included for case study research if content is sold for at least one of the top 5 operating systems for smartphones [Gartner, 2010a]. This further excludes Palm "App Catalog", LG "Application Store" and Sony- Ericsson "PlayNow Arena".

The marketplace must be active and sell paid content in more than five countries. This excludes Motorola Shop4Apps, all operator based marketplaces, AppCentral, O!Market, eStore and Archos "AppsLib". A marketplace must also be accessible as a developer and as a consumer for review during the research period. This excludes Handmark (due to rejection for a developer account) and Handster (unable to register as a developer from The Netherlands).

The resulting cases for research are identified as divided amongst three groups: device manufacturers, (Apple "iTunes App Store", Research In Motion "BlackBerry AppWorld", Nokia "Ovi", Samsung "Samsung Apps"), operating system developers (Google "Android Marketplace", Microsoft "Windows Marketplace"), and independent marketplaces (GetJar, Mobango, Pocketgear and SlideME).

Case Study Questions

From the model of Müller (2005) the focus on the environment of the marketplace, the processes for input, internal workings and output is derived.

Using public press and investor statements, the company that owns the marketplace is described in terms of a product portfolio, annual revenue and the relation to the smartphone industry. Furthermore, figures regarding the marketplace as a product of the company are obtained from public statements of the company.

Information about input and output processes developers are gathered from (I) the subscription process for developers and (II) recording the procedures presented in the developer area of a marketplace.

Information about input and output processes for consumers are gathered from (I) the registration process for consumers and (II) recording the procedures presented in the consumer area of a marketplace.

The business model and value network are derived from combining of information from the public statements of marketplace owners and input and/or output registered processes.

Field procedures

The information for analysis of SSM cases is obtained from press releases and public statements in print or electronic form. The focus lies on primary sources, i.e. company press outlets and communication in documents between companies and public government, based on availability.

Input and output process related information is recorded during registration procedures. By signing on as a developer or consumer in the marketplace, the obtained information regarding the mechanics or processes is stored. Examples of such information sources are Legal Agreements (LA), Terms of Service (ToS), Terms and Conditions (T&C) and End User License Agreements (EULA).

Internal workings of marketplaces are recorded by participation in the marketplace acting as a developer or customer. The recording process is terminated when fees are to be paid above a threshold of $100,- or a total sum of $150,- for participating in the processes of the marketplace. If possible, the researcher avoids expenses and uses existing developer or customer relationships with a marketplace for analysis by contacting such actors. If necessary, supporting actors are registered anonymously, avoiding legal consequences that may be caused by cooperation.

A database is created for this case study, recording all previous mentioned steps per case. A case may be revisited if specific differences later in the process reveal radical different insights, which are mentioned in cross case analysis.

Analysis of data

The recorded information from the sources has been decomposed to be grouped and arranged by subject for comparison. The detailed information then is cross examined and prepared for discussion by creating tables or figures to explain differences and similarities between cases. The examined case results are then discussed using scientific literature research findings.

3.4 Cases

In this section, all individual cases are presented with a focus on company information. The marketplace as a product is named, however throughout the cross case analysis in this section and chapter 4, the SSM is referred to by its company name. Any mentionable observations regarding information gathering processes will be discussed here.

Apple

Although Apple Inc. started the SSM adoption process with the Apple iTunes App Store in 2008, there have been 8 years since the inception of the oldest competitor in this industry. The United States based company designs and sells hardware / software combinations to end users and businesses from 1976. Apple is responsible for business changing products as the iPod and iPhone with the use of distinctive design for the outside and inside user

experience, lock-in strategies and domination of the sales channel allowing for charging a premium on products.

Apple entered the smartphone industry in 2007 with the iPhone with a focus on leveraging existing network connections of network operators allowing for a full web browsing experience [Apple, 2010a]. With the iPhone as single type of device in the mobile phone industry, the #7 position has been claimed [Gartner, 2010c].

During the research on the Apple iTunes App Store, the T&C for the iPhone Application Developer License Agreement have presented a confidentiality clause that prohibits discussion of the LA and T&C. It may be explicitly recorded that the forthcomings of this research is based on public documents provided by the Electronic Freedom Frontier reporting on the NASA case in regard of the Freedom of Information Act applicable in the United States [EFF, 2010]. This scientific discussion therefore is not a breach of any existing relationship between the author of this report and the researched company.

Research in Motion

The smartphone company from Canada started in 1996 with an alternative device for communication that was a two-way pager designed for text communication. With the addition of voice communication technology, the BlackBerry was released in 2002 with push e-mail as distinctive feature, allowing instant response possibilities. BlackBerry devices are sold with complementary network subscription fees, securing revenue per subscriber after the device is sold. The additional mandatory service allows for secure communication channels and improved web browsing experiences through the compression of data.

The BlackBerry AppWorld has been deployed from 2009, allowing for a shopping solution for BlackBerry consumers and a distribution platform for developers [Research In Motion, 2010b]. Research in Motion is the #4 mobile handset manufacturer in the world [Gartner, 2010c].

Nokia

Nokia is the world leader in the mobile phone industry [Gartner, 2010c] previously being a production company in multiple industries. Nokia started with manufacturing mobile phones and mobile infrastructure hardware from 1979 in Finland, switching the main focus of the company to the mobile industry in 1992. The products Nokia produces are sold to business and consumer segments and are distinctive for their ease of use and uniform performance across devices.

The smartphone era started in 1996 with the launch of the Nokia Communicator series. This mobile phone featured a proprietary OS, a full keyboard and screen across the length of the device. The OS had been changed to Symbian OS from 2001. Symbian OS has been acquired by Nokia in 2008 and became an open source OS from 2009. Other smartphones by Nokia feature Maemo, a linux based open source OS [Nokia, 2010d].

Nokia Ovi Store was launched in 2009 and differentiates by offering free navigation software for Nokia smartphone owners.

Samsung

The South-Korean company, founded in 1938 as an export company in food, became an electronics company in 1969 [Samsung, 2010d]. Samsung is #2 in the world of mobile phones sales, with each quarter coming closer to Nokia [Gartner, 2010c]. From chip to finished products with a circuit board, Samsung manufactures business and consumer products ranging from household to professional levels in the categories TV, Video, Mobile, Photography, Computers, Appliances and Industrial devices.

Samsung entered the smartphone industry in 2003 with the Samsung D700 running Symbian. The company currently produces smartphone devices for all licensed and open source operating systems: Symbian, Windows Mobile & Android. Furthermore, Samsung has developed a proprietary OS (Bada) for all entertainment devices in the product portfolio: TV, Media Players and Photo cameras [Samsung, 2010d]. Samsung differentiates by offering value for money products, having all types of components in its own semiconductor portfolio that is also sold to competition.

Samsung Apps is the marketplace that has been deployed from 2009 to cater the wide variety of smartphones offered by Samsung, preparing for the new operating system Bada that will be featured in a larger range of products.

Google

Google started in 1998 as incorporated company to become the largest search engine for the internet. The US based company generates revenue incomes mainly by selling targeted advertisements to consumers of Google products. The product portfolio covers many, non-physical products and services for consumer and business clients. Operating systems, communication software and solutions, media storage and productivity tools, all featured as 'free to use' with sponsored and tailored advertisements [Google, 2010c].

The smartphone industry was entered by the acquisition of Android Inc. in 2005, a company that built an OS for mobile phones. Android became an open source project embedded in the Open Handset Alliance, a conglomerate of smartphone industry players working together for design of open industry standards founded in 2007 [Open Handset Alliance, 2010].

The Nexus One presented in 2010 has been the first physical device shipped by Google for consumers, since inception of Android. The device was built by HTC and sold directly via a webshop storefront by Google [Google, 2010c]. Android became the #3 smartphone OS in the second quarter of 2010 [Gartner, 2010c].

The Android Market was opened in 2008 featuring free content and opened for sales in 2009. Developers for the Android Market have been attracted by various Android Developer Challenges (ADC). The first ADC featured 5 million dollar prize money as an encouragement for the participation [Google, 2010d].

Microsoft

Founded by Bill Gates and Paul Allen in the US in 1975, Microsoft currently is the market leader for desktop OSs. Next to operating systems for desktops and mobile devices, Microsoft develops hardware and software for consumer and business clients, ranging

from professional and personal productivity software, business support packages, games and consoles.

Microsoft initially developed a mobile operating system for the PDA industry from 2000 and grew significantly in market share. From this position, the market share fell from the moment that the iPhone was launched by competitor Apple. The Windows Mobile OS market share further declined to 5% in favor of BlackBerry OS and Android in 2010 [Gartner, 2010c].

In anticipation of a newly designed OS product named Windows Phone 7, Microsoft launched a marketplace for the smartphone division named "Windows Marketplace" in 2009.

GetJar

Started by Ilja Laurs in 2004, GetJar is the second largest application store in download volume with content for smartphones and non-smartphones. The US based company's offered content is free for users, and mainly features shareware or time-limited products which have to be bought later on for further use. The frontend website is directly accessible for consumers, but the backend is also available as a whitelabel solution for mobile network operators.

To increase the content portfolio with applications that are free to use by consumers, GetJar incorporated an advertising mechanism for developers.

Mobango

The application marketplace by Mobango was founded in Italy in 2004 targeting mobile applications and customization options for non-smartphones. The content portfolio expanded to contain smartphone software for BlackBerry, Windows Mobile, Symbian and Android OS [Mobango, 2010b].

Mobango is a marketplace with content that is free for consumers, being freeware, shareware, demo, trial software or advertisement driven. Furthermore, the marketplace is only partially a marketplace in nature; the business model is different from all competitors as is discussed in chapter 4.

PocketGear

PocketGear has been founded in 1999 in the US as a marketplace for PDA software. From this moment on, PocketGear has been acquired by various companies and merged a few times, the most recent change being the acquisition of Handango, a rival marketplace [PocketGear, 2010a].

Currently, the marketplace of Pocketgear serves applications for all smartphone operating systems except iOS. The storefront is highly localized, reflecting the mergers and acquisitions in the past, targeting previous consumer segments. There are 16 storefronts serving customers in 7 languages depending on the pre-merger label [PocketGear, 2010b].

SlideME

The marketplace by SlideME has been created in 2008 in reaction to the small number of countries supported for paid transactions by Google for the Android OS. The marketplace owner provides in alternative ways of payment to further accommodate software suppliers and customers.

SlideME was contracted by Vodafone Egypt and Sony Ericsson for pre-installation in the Middle East on devices. HTC supplied pre-installations of the SlideME marketplace for Malaysia and Vietnam [SlideME, 2010].

3.5 Conclusion

In this chapter, the literature covered in chapter 2 is applied to the environment and businesses for Smartphone Software Markets. The knowledge Marketplace strategy issues are defined for SSM research, as are the knowledge trading processes.

The result is applicability of the model described by Müller (2005) concerning applications in SSM as documented knowledge assets designed by software suppliers and consumed by smartphone owners for a transaction fee. The market engineer tries to influence the demand and supply side of the two-sided network by making decisions on the design of the marketplace. By the nature of the product in the market, the general design of the trading process is described resembling documented knowledge asset transfer, but might be adapted if necessary.

By researching the business models and ecosystems of SSM, a detailed description of the processes between actors and their environment can be registered. The STOF model [Bouwman et al, 2008] is used to identify implications regarding domains of the business model design by topic relationships. The main focus lies on the organizational domain of the STOF model.

The case study design by Yin (2003) describes in detail how to conduct research covering multiple cases. The cases are recorded using a protocol prior to analysis. By using such a protocol and the E3 modeling technique by Gordijn & Akkermans (2001), challenges for case study research as identified by Halinen & Tornroos (2005) are minimized. The case study protocol describes in detail how and what is measured and recorded for analysis. From the inclusion and exclusion criteria determined, a subset of 10 cases remains for analysis from a larger set of 31.

The 10 cases are introduced by company backgrounds, product portfolio, smartphone business relation and marketplace solution. The competing companies are very diverse in nature, ranging from a history in consumer electronics to software development on operation systems, or less computer related industries. In the cross case analysis of chapter 4, the SSM products are compared between all 10 cases.

4 Cross Case Analysis

In this chapter, the SSM cases as described in chapter 3 are compared by features regarding the marketplace configuration. First, the business model of the SSM of a marketplace owner is described and general information regarding marketplace differences is discussed. Second, the general Value Network derived from the case study recorded data is presented, along with individual case discussion. Third, the internal processes of the cases are compared and discussed. Finally, the external process discussion of the individual cases completes the case study discussion.

4.1 Business Models

The business model for the SSM for market owners is different based on the group each market owner belongs to. Smartphone device manufacturers, OS manufacturers and independent marketplaces differ by the target why a marketplace is deployed. With each OS specific transaction, an end user entrenches into vendor lock-in mechanics, making the switching costs for consumers higher to other platforms [Shapiro & Varian, 1999].

Apple, RIM, Nokia and Samsung use the marketplace to create user value for the smartphone that is sold. Having a marketplace with a wide variety of content of utilitarian or hedonistic nature increases smartphone device or OS specific value (in case of Nokia, Microsoft, Google or Samsung). Therefore it is important to mention the multi-level importance for device manufacturers over OS manufacturers. Samsung avoids exclusion of particular customer preference by manufacturing smartphones for all licensable OSs.

Independent market owners try to attract developers for all platforms, creating their particular value for customers and possibly a relationship with customers over time catering to smartphone application demand even after switching an OS.

Table 6 shows differences between the SSMs based on specific SSM (content) figures in August 2010. Blank spaces in this table resemble lacking data.

	# of content items	# of developers	Revenues paid ($)	# of downloads
Apple	225.000[a]	43.185[c]	1 Billion[a]	5 Billion[a]
RIM	9.871[d]	-	-	-
Nokia	1.213[e]	-	-	-
Samsung	847[f]	-	-	-
Google	70.000[b]	10.199[c]	0,02 Billion[l]	1 Billion[b]
Microsoft	717[g]	-	-	-
GetJar	73.866[h]	317.570[h]	-	>1 Billion[h]
Mobango	20.590[i]	-	-	>0,7 Billion[i]
PocketGear	140.000[j]	32.000[j]	-	-
SlideME	2.228[k]	-	-	-

Table 6: Market figures for SSM competitors
[a] [Apple, 2010b], [b][Google, 2010a], [c][Appstoreshq, 2010], [d][Research In Motion, 2010d], [e][Nokia, 2010b], [f][SamsungApps.com, 2010], [g][Microsoft Corporation, 2010b], [h][GetJar Networks Ltd., 2010b], [i][Mobango Ltd., 2010b], [j][PocketGear, 2010], [k][SlideME, 2010], [l][Larva Labs, 2010]

The main revenue generating model is a revenue share deal for sales of developer content. The independent marketplaces GetJar and Mobango have a different approach, where the content is free for the user. In these marketplaces revenue is generated by selling promotions, allowing developers to influence the position of software in the catalogue or being featured on the website.

PocketGear is a marketplace running on revenue share, but has similar to GetJar a whitelabel storefront solution for mobile network operators to generate additional revenues. SlideME charges no costs to developers, but generates revenue by selling pre-installation licenses for mobile network operators or device manufacturers in countries where sales through the android marketplace by Google is not available.

Google's SSM is a revenue share model, but also generates revenue by selling specifically targeted advertisements based on extensive user data insights derived from usage of many Google services in the Android OS. Just like Google, the SSMs of GetJar, Nokia and Microsoft have a proprietary advertisement channel allowing for secondary revenues and an opportunity for developers to create subsidized software.

The SSM cases show no option for private trade offerings, as noted by Standing, Standing & Love (2010) which allow for trust relations to thrive between supplier and consumer. SSM in general serve the purpose of trading to consumers as described by Li, Liu & Banyopadhyay (2010), however, only Apple resembles undertaking steps to differentiate the marketplace by less focus on attracting developers. Nonetheless, the market content does not yet reflect the statement that market efficiency is increased by suppliers charging premium prices, therefore shared revenue.

Two identified challenges by Haaker et al. (2007) concerning the domains of the business model in a STOF model arrangement are emerging from the case study. In the service domain, creating a compelling product offering seems difficult. Some cases resemble the bandwagon effect, like Nokia, Samsung, Microsoft and SlideME based on the number of content items. Furthermore, GetJar, Mobango, PocketGear and SlideME discuss openly the number of developers, content items or number of downloads, but could differentiate by presenting stories of successful revenue driven content in earned revenues for developers. In the technology domain, Samsung, Microsoft and Nokia are challenged by the integration of their own emerging platforms, Bada, Windows Phone 7 and Maemo respectively.

The licensed usage of the SSM by GetJar, PocketGear and SlideME resemble B2B solutions, where none of the cases researched is a business content targeted SSM. With these descriptions from the previous and current paragraphs, the research results by Haaker et al. (2007) have been identified partially: the customers being end users or businesses, the offering being traded software or the marketplace as whitelabel solution, the earnings logic for each SSM and the resources for a SSM. The remaining parts are discussed in the following sections of this chapter, covering the actors, organization, and processes.

4.2 Value Network

In this section, first the general model for SSMs derived from the cross case analysis is presented. Then, the actors in this general model are presented and discussed, along with their implications.

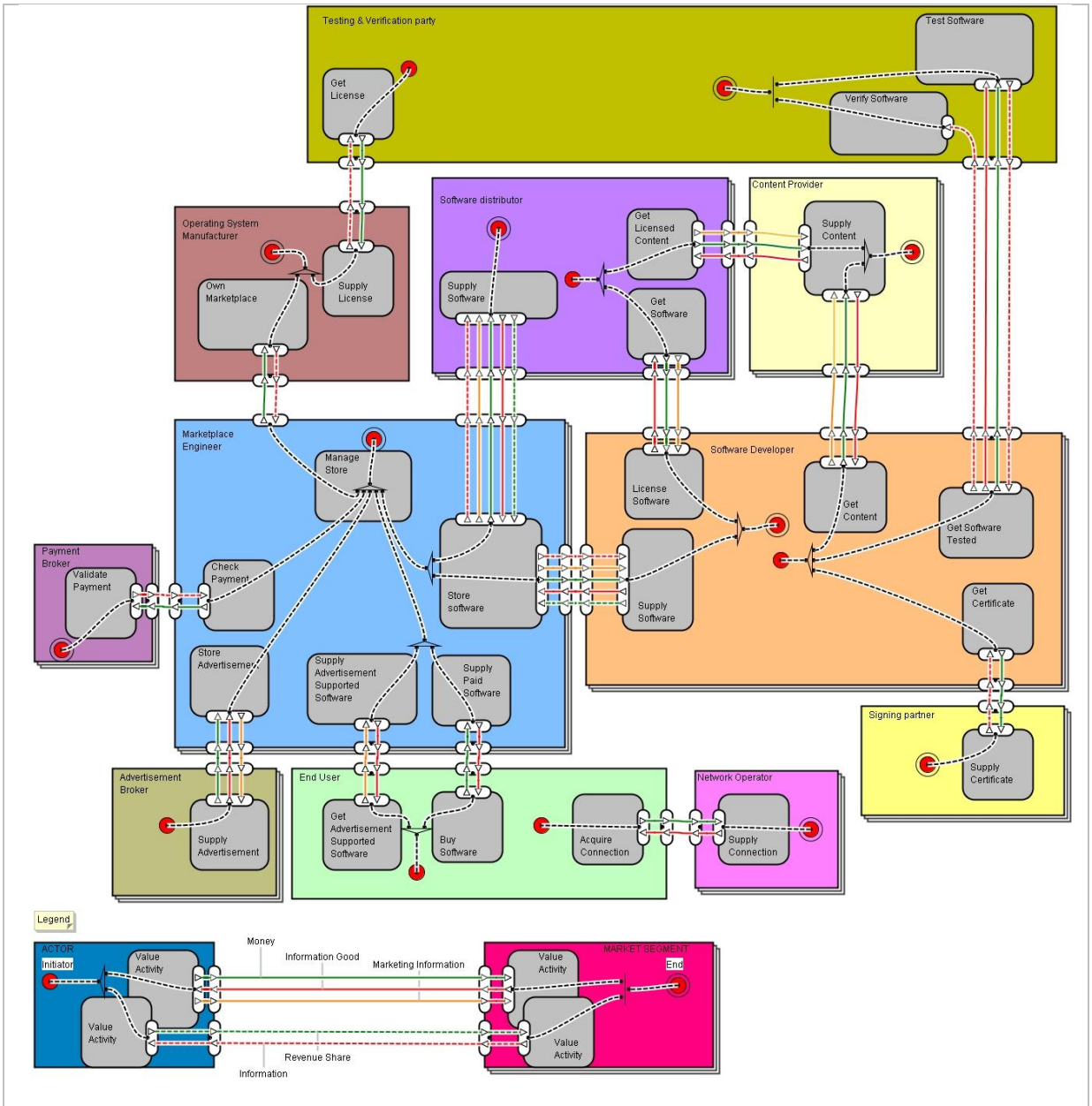

Figure 15: Total SSM Value Network configuration according to E3 modeling [Gordijn & Akkermans, 2001].

From the researched cases, a general Value Network configuration for SSMs is modeled in E3 standard, shown in figure 15 [Apple, 2010a, Research In Motion, 2010c, Nokia, 2010a, Samsung, 2010d, Google, 2010b, Microsoft Corporation, 2010a, GetJar Networks Ltd., 2010a, Mobango, 2010a, PocketGear, 2010c, SlideME, 2010a]. It shows the individual actors in relation to each other, connected by the value exchanged during each actor's value activity. Value transactions always have a starting and an end point, connected through activities that are optional (OR relations) or mandatory (AND relations). For example, for

software that is tested and verified by the testing& verification party, a license and software are mandatory before a test approval can be issued to a software developer. However, a software developer does not always need a certificate to supply software to a marketplace engineer.

The individual actors of figure 15 are described in table 7. The transactions involve the exchange of money and / or information about end users in exchange for information goods. The goods transacted can be licenses, network connections, software or advertisements. The individual value activities for each actor and transacted value are described in detail in Appendix 2.

Actor Name	Color	Description	Example
End User	Mint	The owner of a smartphone	You
Network Operator	Magenta	The supplier of a network connection for smartphones	T-Mobile
Payment Broker	Plum	The supplier of information regarding (credit card) payments	PayPal, Amazon, Visa, American Express
Advertisement Broker	Olive	The supplier of advertisements for in applications	AdMob, Microsoft, Yahoo
Marketplace Engineer	Blue	The owner of the SSM	SlideME, Apple
Operating system manufacturer	Maroon	The manufacturer of the OS	Apple, Microsoft, Google
Testing & Verification party	Mustard	The 3rd party assigned with testing & verification of software	Sogeti HT
Signing Partner	Yellow	The 3rd party supplying a signing certificate	VeriSign
Software Developer	Salmon	The software provider	Larva Labs, Layar
Content Provider	Magnolia	The content provider for software	Disney, Warner Brothers
Software Distributor	Purple	The software aggregator, intermediating in providing software	EA Games

Table 7: Actors in the general SSM E3 Value Model

The owner of a SSM can embody one or more acting roles, defining a value network representation differentiation between SSM owners. The span of control for roles in the Value Network allows for capturing single or multiple revenue streams, maximizing money inflow and minimizing money outflow. In the general SSM Value Network as featured in figure 15, the main money inflow is created by End Users consuming software and Advertisement Brokers supplying advertisements. Money outflow is dominated by payouts to individual Software Developers and Software Distributors.

A SSM owner can influence the processes of inflow and outflow by differentiating, through process remodeling or setting different requirements than competitors, allowing for higher inflow or lower outflow of money. The leverage between money inflow and outflow resulting in revenue is a measure of market efficiency.

The individual configurations for the researched cases are depicted in figure 16. In this figure, each party is represented with black boxes showing acting roles covered by the SSM owner. Grey boxes are actor roles where the SSM owner has a limited influence upon the acting role, allowing for an increase in market efficiency. Empty boxes are parts of the Value Network that are not under control of the SSM owner. End Users, Software Developers, Software Distributers and Content Providers are influenced by one restriction for all researched marketplaces, Adult content.

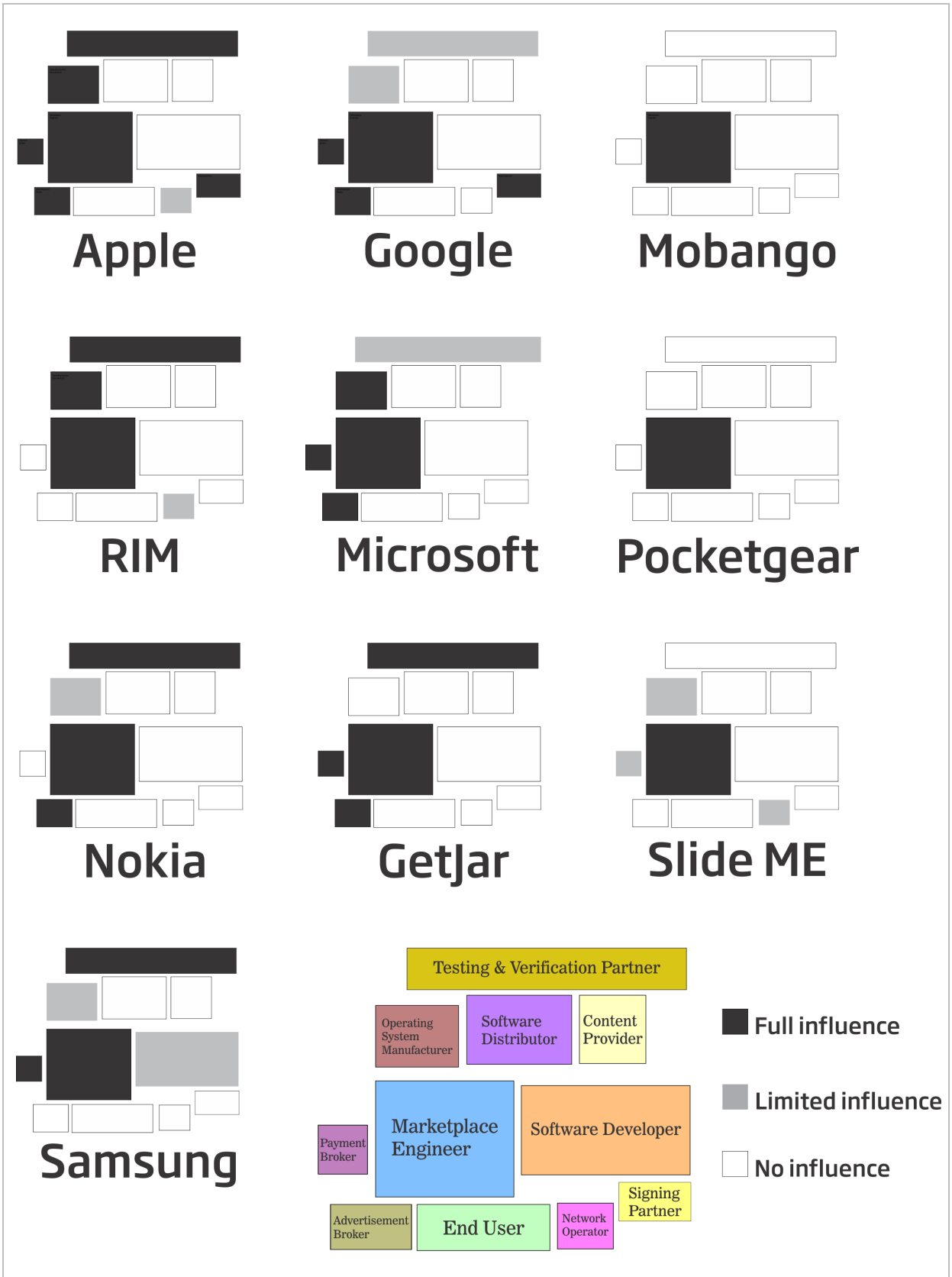

Figure 16: Comparison of Value Network configurations and influence levels [Apple, 2010a, Research In Motion, 2010c, Nokia, 2010a, Samsung, 2010d, Google, 2010b, Microsoft Corporation, 2010a, GetJar Networks Ltd., 2010a, Mobango, 2010a, PocketGear, 2010c, SlideME, 2010a]

Apple

Nearly all of the Value Network actor roles are covered by Apple for the iTunes App Store. The only exception is the mobile network connection, which is necessary for End Users to utilize the smartphone with 3G connectivity. Apple influences this actor of the Value Network through contracts with network operators for 1-2 years of exclusive distribution, in return for a revenue share on the monthly charges towards End Users. Apple therefore has all money inflow and outflow parts under control, allowing for high market efficiency and lower coordination costs.

Research in Motion

The BlackBerry AppWorld acts as marketplace engineer, OS manufacturer and testing & verification partner. By testing in-house, one external party is removed for content inflow. Software suppliers need a certificate from a Signing Partner in order to submit content. RIM charges an additional monthly fee through Network Operators to use additional RIM services. Advertisements are outsourced to Yahoo, Payments are outsourced to PayPal.

Nokia

Ovi Store has multiple ways for payments, through Mobile Network Operators, Digital River Inc. as payment broker and SMS brokers. Nokia has a proprietary advertisement program and has two operating systems embedded in smartphones, both open source. For Maemo, testing & verification is done in-house with no signing necessary, Symbian and J2ME applications require testing & verification and signing by external parties.

Samsung

Samsung Apps handles the marketplace, testing & verification and payments. One particular issue differentiates Samsung from other parties: Samsung keeps the privilege of creating competing products with submitted applications by Software Developers and Software Distributors. Applications that are submitted are required to contain full non-obfuscated source code. Applications that are submitted can be rejected by third parties, also known as liaisons of Samsung. These requirements are potentially infringing intellectual property of software suppliers.

The OS area is partially influenced, because Samsung Apps contains content for non-proprietary OSs like Android, Windows Mobile and Symbian, but also content for Bada, the OS developed by Samsung.

Google

The main differentiator for the Google Android Market is the absence of a testing and verification party or process. Google designed the Android Market with a ‘free market’ philosophy where the market regulates itself. Google released Android as an open source OS for the Open Handset Alliance, resulting in at least one clone (OPhone) that is removed of Google services by China Mobile with a proprietary marketplace. Google issues signing certificates for free upon registration as a developer. The advertisements are supplied by Google itself as well as the payment transaction handling.

Microsoft

The marketplace configuration of Windows Marketplace by Microsoft issues licenses to testing and verification partners as an OS manufacturer, controlling the content quality input. With the Bing network, advertisement solutions for developers are provided and payments are handled by Microsoft.

GetJar

The GetJar configuration requires for multiple OS contents that testing and verification standards are applied. GetJar provides advertisement and payment solutions for developers.

Mobango

The market of Mobango is only supplying software, with no further proprietary features. Furthermore, transactions are outside of the marketplace; revenue is created by marketing campaigns instead of transactions.

PocketGear

The PocketGear marketplace is a standalone service that relies on external parties for all parts of the value network except for the marketplace itself.

SlideME

SlideME has a limited audience targeting only one OS with content. It therefore has limited influence with regard to OS manufacturers, but can leverage this by the open source nature of Android. SlideME offers multiple solutions for payment and is contracted by network operators and hardware manufacturers.

With the explanation of the various market configurations in terms of the Value Model, one the challenge of the organizational domain for the STOF model has been discussed: Division of roles in a complex value network [Haaker et al., 2007]. The E3 value network representation, in regard to the STOF model [Bouwman et al., 2008], shows for the organizational domain how the acting roles are defined for SSMs along with resources, value activities and interactions.

Together with the results from paragraph 4.1, the delivered value is made explicit for the financial domain. This covers the key challenge identified by Haaker et al. (2007) for the financial domain: combining multiple revenue models. Although that PocketGear and GetJar position fewer roles in their respective Value Network, they leverage their assets to generate more revenue. In the same fashion, Google and Microsoft leverage existing assets as the advertisement broker capabilities to generate additional revenues.

Google and Nokia show that an open business model as described by Chesbrough (2007) is an option. Google is joined by many partners for this model in the Open Handset Alliance, something that Nokia later started in the Maemo community. The main difference between these two is that the Open Handset Alliance is focused on creating value through hard/software combinations by for profit companies, whereas the Maemo community comprises open source initiatives.

The next discussion is on the market focus as presented by Zhai et al. (2009). The general SSM design is focused towards buyers which would imply being more likely to fail. Software in marketplaces analyzed by Martens (2010) shows that SSM have lower prices than non-SSM software marketplaces which confirms the buyer focus. However, Apple designed the marketplace in such a way that product quality is high, in spite of low prices, making the Apple SSM difficult to categorize. Independent marketplaces as GetJar, Mobango and PocketGear are similar to neutral markets, having started before the iPhone introduction or mimicking existing exchange networks [Zhai et al., 2009].

As the previous paragraph shows, the topic of the battle between SSM owners cannot yet be determined by the Business Model and Value Network alone. Therefore, the following sections cover the processes of SSMs will be used to determine further adoption issues leading to critical mass.

4.3 Internal Processes

In this section, the processes that comprise the internal workings of the researched cases are presented and discussed. First, pricing mechanisms, payout and accompanying fees are featured. Second, reputation systems are the topic of discussion for ratings and reviews. Portfolio systems are the final subtopic of internal processes discussion.

4.3.1 Pricing, Payout & Fees

A summary of the topics that are discussed in this subsection is given in table 8, showing the payout shares, possibility of additional reductions of revenue shares, mandatory price points, allowing sales in multiple currencies, the division of separate sales areas and the number of countries where the SSM is selling content. For the counties, WW stands for WorldWide.

	Payout Share	Additional reductions	Price Points	Multiple Currencies	Sales Areas	Countries
Apple[a]	70%	-	Yes	Yes	Yes	90
RIM[b]	70%	-	Yes	-	Yes	13
Nokia[c]	50-70%	Yes	Yes	-	Yes	WW
Samsung[d]	70%	Yes	Yes	-	-	78
Google[e]	70%	Yes	-	Yes	Yes	14
Microsoft[f]	70%	Yes	Yes	-	-	30
GetJar[g]	-	-	-	-	-	WW
Mobango[h]	-	-	-	-	-	WW
PocketGear[i]	50%	Yes	Yes	-	Yes	WW
SlideME[j]	79-95%	Yes	-	Yes	-	WW

Table 8: Market mechanisms per SSM derived from Terms of Service.
[a] [Apple, 2010e], [b][Research In Motion, 2010c], [c][Nokia, 2010a], [d][Samsung, 2010b], [e][Google, 2010b], [f][Microsoft Corporation, 2010a], [g][GetJar Networks Ltd., 2010a], [h][Mobango., 2010a], [i][PocketGear, 2010c], [j][SlideME, 2010a]

Pricing

If table 8 shows a Yes in the column of Price Points, this means that there are predefined price points by the market owner. A software supplier is free to choose any of these points for the value of the traded good, i.e. €0,99 or €1,99. The maximum price for a traded good is different per market; Apple has a maximum of $999, where Microsoft handles a threshold of $99. Some SSMs have limitations in regard of the payment method used, such as SMS payments with a limit of €3,-. The described situation is called static pricing by Grewal, Chakravarty & Sini (2010) which is the opposite of auctions. The findings of their research on auctions support the need for a reputation system, which is discussed in paragraph 4.3.2. Currently, no SSM has an auction system for pricing.

Three markets allow multiple currencies to be used. Apple only allows a different currency in combination with an iTunes designated market sales area, for example British Pounds in Great Britain. Google and SlideME let the software supplier choose the currency, where Google gives the opportunity to charge in US Dollar, British Pounds, Euro or Japanese Yen. SlideME also covers other local currencies depending on the target audience local credit card handler. When a sales area is applicable, the software supplier has the opportunity to apply different price levels. This is the effect known as segmentation, research by Yankelovich & Meer shows that customer satisfaction drives sales by tailoring product features to consumer segments. The SSM system designed by Google in combination with its services and the Android OS are, reviewed by research findings by Phang, Kankanhalli, Ramakrishnan & Raman (2010), very beneficial. Traditional demographic segmentation is not explaining shopping behavior of customers. Robust profiling techniques and unobtrusive clickstream data collection gives better insight in consumer motivations.

Payout

The main difference between the model presented by Müller (2005) and the SSM research findings are the payment flows. In the model for digital documented knowledge assets, payment between the advice seeker and the expert is modeled directly.

In the case of an SSM, the payment process is indirect where the SSM owner collects the sales revenues and pays the software supplier on a predefined way. The account revenues are used furthermore for dispute settlement and / or promotional activities for markets as Mobango and GetJar.

The payout periods are quite similar, distinguishing between monthly and quarterly. All marketplaces have a minimum revenue payout level, ranging from €150 to $300. The revenue share payouts are generally a fixed percentage: 70%. Nokia and SlideME deviate from this rule, relating to different payment options for consumers, such as SMS or mobile network operator billing. Furthermore, these parties cover a lower revenue share model for lower sales prices. PocketGear is the only party significantly sharing less with software suppliers, for which the reason could be the absence of supplier registration costs as discussed in section 4.4.4..

Fees

The payout transaction fee depends on the registered payout party, being a credit card company, another payment broker like PayPal or payout to a bank account; all methods let the benefactor pay for the transfer process.

Dispute fees can occur and come from refunds or complaints where the software supplier revenue account is used for settlement. This is applicable for all marketplaces.

There are additional fees applicable, such as taxation issues for Nokia and Microsoft if taxes cannot be proven inapplicable for the given relationship. Furthermore, Microsoft refuses payout until several tax forms with software supplier bank account and business VAT and registration evidence are produced.

4.3.2 Reputation System

Reputation systems are used to establish trade quality by lowering information asymmetry, which lets sellers charge a premium for quality goods [Sun & Liu, 2008]. All SSM cases in the case study have such reputation systems, consisting of a rating part and a review part.

Application rating

The rating system covers requires consumers to value the product within a range of 1 to 5 points, resembling a Likert scale. This type of rating is very primitive and leaves no room for nuance, as it is a single scale. Research by Mudambi & Schuff (2010) shows that this type of reputation system is troublesome if this is not mandatory linked to a review, which can improve helpfulness of reviews. Extremes in this type of reputation systems are found to be less helpful than moderate reviews.

Application review

In the SSM designed reputation systems, it is not possible to post a review without a rating. Whilst the review should be used for creating insight about the rated product, reviews are often used for feedback to software suppliers instead of direct contact.

The above described review use leads to price dispersion according to Grover, Lim & Ayyagari (2006). Furthermore, information overload caused by low quality products created by less experienced suppliers can reduce market efficiency. Zhou, Dresner & Windle (2008) researched the effect of low quality products of dishonest sellers that benefit from information overload or equivocality that can drive out quality producing sellers. Market efficiency is clearly affected by such problems.

Research by Martens (2010) reveals that in Smartphone Software Marketplaces 1 to 3% of the consumers give their opinion by rating and /or reviews. Most of these reviews are categorized as extreme according to the research of Mudambi & Schuff (2010).

Granados, Gupta & Kaufmann (2010) concluded that if an E-marketplace applies a transparency strategy targeting system design, reducing information asymmetry, consumer spending behavior can be positively influenced. Improving the design to encourage transaction partners to use the reputation system effectively is a necessity for market reinforcement [Zhou, Dresner & Windle, 2008].

4.3.3 Portfolio management

As discussed with the topic of reputation systems, information about products in B2C E-marketplaces is trivial according to Granados, Gupta & Kaufmann (2010). The overview created by Standing, Standing & Love (2010) identifies codifiability of products and order fulfillment specifications of transactions being relevant factors influencing transactions.

Portfolio management tools are therefore crucial, providing the means for software suppliers to codify and define fulfillment specifications by setting pricing options and contact information. Codification is furthermore important because it is accessed by search processes in the SSM where precise codification lowers information asymmetry.

All SSM in the case study present such tools, but all lack concise guidelines for effective codification. Research by Martens (2010) shows that smartphone software for 64 wine guides is codified in equivocal ways, increasing search costs for consumers.

Table 9 presents the content on OS level that can be managed for each SSM in the case study in the market through the portfolio management tools in the SSM. The content submitted for transaction requires product descriptions, price setting and optionally sales area selection. RIM and Microsoft software content furthermore requires separate device specification. Upon submission, the information can then be used by the matching mechanism in the SSM. The processes for matching mechanisms are discussed in the next section, as part of the external processes.

	iOS	BlackBerry	Maemo	Symbian	Android	Windows Mobile	J2ME	Palm	Flash
Apple[a]	x								
RIM[b]		x							
Nokia[c]			x	x			x		
Samsung[d]				x	x	x	x		
Google[e]					x				
Microsoft[f]						x			
GetJar[g]		x		x	x	x	x		
Mobango[h]		x		x	x	x	x	x	x
PocketGear[i]		x		x	x	x	x	x	
SlideME[j]					x				

Table 9: Content catalogue per SSM on OS level
[a] [Apple, 2010e], [b][Research In Motion, 2010c], [c][Nokia, 2010a], [d][Samsung, 2010b], [e][Google, 2010b], [f][Microsoft Corporation, 2010a], [g][GetJar Networks Ltd., 2010a], [h][Mobango., 2010a], [i][PocketGear, 2010c], [j][SlideME, 2010a]

4.4 External Processes

In this section, the external processes are discussed by five topics. First, the matching mechanisms for SSMs are presented. Second, the payment processes are portrayed and discussed. The third process is the sponsoring content transaction process. As fourth topic, the registration process for software suppliers is analyzed. Finally, the content submission processes for each SSM are compared and discussed.

4.4.1 Matching Mechanisms

Matching mechanisms are the ways how end users can discover content in the SSM. An overview of the various mechanisms deployed by SSM owners can be found in figure x.

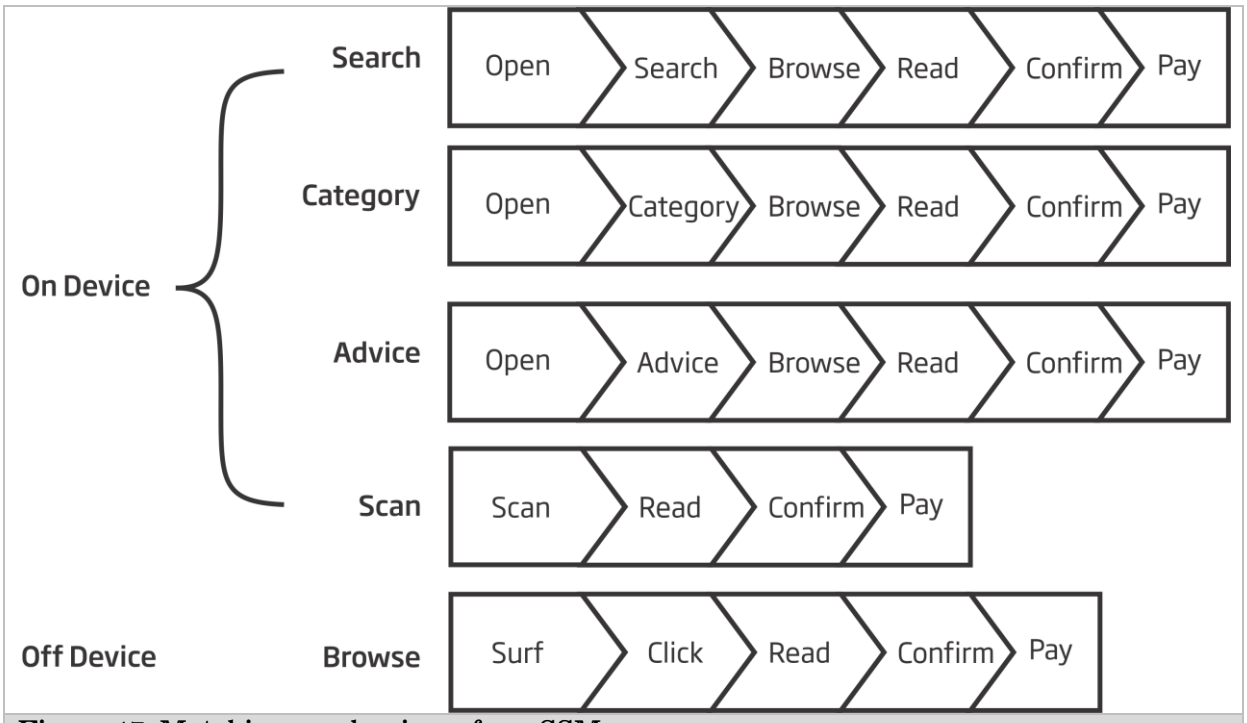

Figure 17: Matching mechanisms for a SSM
[a] [Apple, 2010e], [b][Research In Motion, 2010c], [c][Nokia, 2010a], [d][Samsung, 2010b], [e][Google, 2010b], [f][Microsoft Corporation, 2010a], [g][GetJar Networks Ltd., 2010a], [h][Mobango., 2010a], [i][PocketGear, 2010c], [j][SlideME, 2010a]

The matching mechanisms are divided amongst two types, on device content matching by using the smartphone for discovering content, and off device content matching by using desktop software or an online catalogue.

A search process represents a query entered by an end user to the matching system tool on the device, which presents results that are browse able. The end user then reads the codified information that is submitted by a software supplier, confirms the product choice and then pays for the product. The process steps Browse, Read, Confirm and Pay are equal for Search, Category and Advice mechanisms. Category searches are searches within subsets of content, predefined by categories assigned by software suppliers. Advice searches are dynamically generated based on user preferences. The last on device search process is Scan. An end user uses the camera in the smartphone to scan a barcode or QR code to be directly taken to the specific product page. From this page, the Read, Confirm and Pay steps are identical as described previously.

The off device search through desktop software or online catalogue allows the end user to browse the content catalogue, click on specified item and then follow the aforementioned steps of Read, Confirm and Pay.

Currently, all SSM matching systems have Search and Category capabilities. Apple features the Advice mechanic with the Genius algorithm. Google has enabled the scan

functionality through 3rd party applications by defining a new hypertext link. Off device browsing is available for all SSM in the case study, however, Google and SlideME lack buying through the online catalogue.

Investing in the matching mechanism has been discussed by Standing, Standing & Love (2010), as well as search processes for E-marketplace content. Kumar & Lang (2007) propose system improvements which lead to higher E-marketplace efficiency through lowered search costs. Improvements are necessary for compensating poor search term specifications. Search cost research by Sankaranarayanan & Sundararajan (2010) revealed two ways of lowering search costs: by reducing the costs of acquiring generic published information (in the case of a SSM, product descriptions) and facilitating faster and less costly communication of specific information (in the case of a SSM, end user relevant product descriptions).

4.4.2 Payment

The last step in the matching mechanisms described in the previous section is payment. The payment process in a SSM can be fulfilled in different ways, as shown in figure 18. The process steps are combined with the matching processes to illustrate that this is (I) an integral process perceived by the end user and (II) related to the interconnectedness of multiple systems between the SSM technical domain and organizational domain as described in the STOF model [Bouwman et al., 2008].

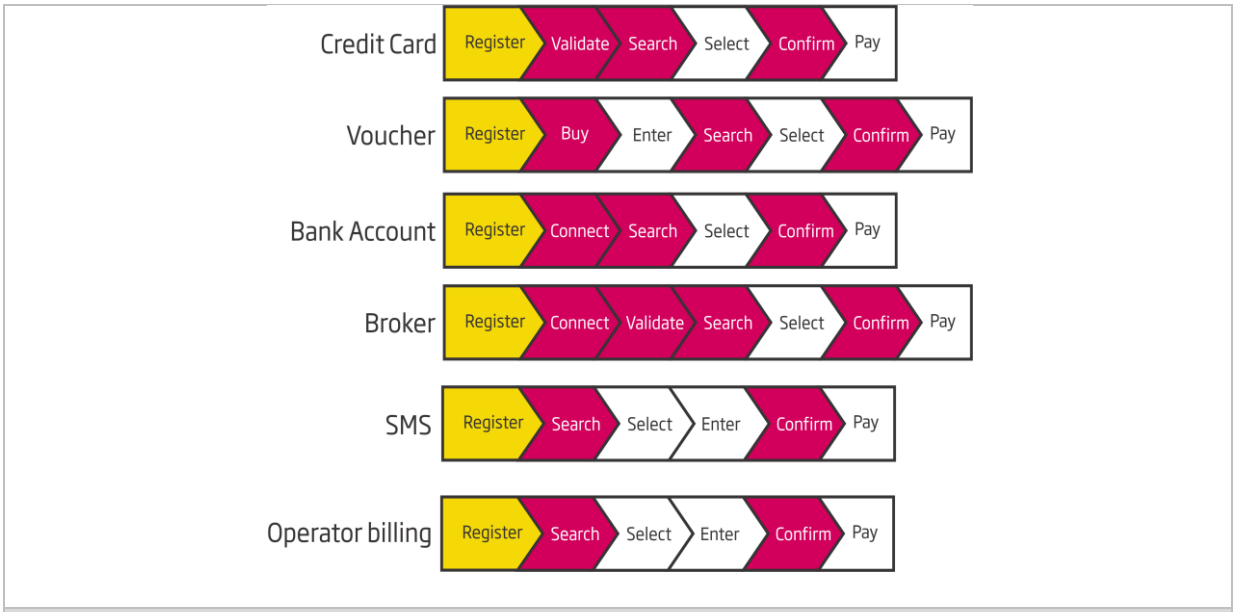

Figure 18: Payment types and process steps for SSM
[Apple, 2010e], [Research In Motion, 2010c], [Nokia, 2010a], [Samsung, 2010b], [Google, 2010b], [Microsoft Corporation, 2010a], [GetJar Networks Ltd., 2010a], [Mobango., 2010a], [PocketGear, 2010c], [SlideME, 2010a]

In figure x, the red process arrows represent steps in the process of payment where the process can be subject to abortion, by the end user or another party. The yellow process arrow represents the necessity for end users to be registered to consume or browse catalog content. All methods for payment contain the following steps: Search, Select, Confirm, and Pay. Search is aborted by the end user due to the absence of fulfilling

content. Select is the choice for a specific content item in the catalogue. Confirm for acquiring the content is aborted when the end user decides to not proceed. Pay is the completion of the financial fulfillment of the negotiation.

When using a Credit Card, the Validate process step is considered. Credit Cards need to be registered with the consumer and need to be validated by the payment broker in order for the transaction not to be aborted.

Vouchers need prior acquisition, which can be obtained digitally or physically. If such a voucher is not obtainable, no transaction is possible, resulting in an aborted transaction. The next step, Enter is deemed to be of no consideration for an aborted process.

The Bank Account transfer needs connection to a bank, to verify the transaction funds to be withdrawable. If the connection fails or insufficient funds may be available, the process is aborted.

A similar connection process step is found in the Broker payments. Not only needs there be a connection, also the account needs to be validated as in the Credit Card situation.

SMS payments and Operator billing have no further aborting inhibiting process steps, assuming that end users can enter codes for the transaction.

An overview of available payment processes per SSM is provided in table 10. In this table, PayPal and Amazon Payments are Broker payments. The L in the column of Operator Billing defines the limited nature of the service, not all countries and operators are yet connected for this payment method.

From the described situation, it can be derived that having fewer process steps that can result in an aborted transaction is preferable. Credit Card payments are the favorite method of payment in most SSM designs, but are not adopted equally worldwide by end consumers. Furthermore, reducing the dependencies for a SSM owner to third parties by role integration benefits the SSM system design. Allowing multiple payment options for end users increases the possibility of consumption by the reduction of search costs according to Bunduchi (2005).

	Credit Card	Voucher	Bank Account	PayPal	Amazon Payments	SMS	Operator Billing
Apple[a]	x	x	x				
RIM[b]	x			x			
Nokia[c]	x					x	L
Samsung[d]	x					x	
Google[e]	x						
Microsoft[f]	x						
GetJar[g]	x			x		x	L
Mobango[h]						x	L
PocketGear[i]	x	x	x	x		x	
SlideME[j]	x			x	x		L

Table 10: Payment methods per SSM
[a] [Apple, 2010e], [b][Research In Motion, 2010c], [c][Nokia, 2010a], [d][Samsung, 2010b], [e][Google, 2010b], [f][Microsoft Corporation, 2010a], [g][GetJar Networks Ltd., 2010a], [h][Mobango., 2010a], [i][PocketGear, 2010c], [j][SlideME, 2010a]

4.4.3 Sponsoring content

One specific case of content that is free to use for End Users, has sponsored content such as advertisements built in the software. The advertisement is used to attract potential customers to a dedicated sales environment, which can be accessed through interaction with the advertisement.

SSM owners Apple, Google, Microsoft, Nokia and GetJar have specific solutions that act as a hub for advertisers. From this hub, developers of content have the possibility to generate revenue by integrating the advertisements that are submitted to the advertisement aggregation. To implement such a feature, developers can use predefined code, allowing low effort integration.

The approach in acting as a hub for a SSM owner in aggregating advertisers' content can increase market efficiency by offering more content at lower prices for End Users and providing alternative revenue streams for suppliers [Standing, Standing & Love, 2010].

4.4.4 Registration Process & Expenses

The registration process for software suppliers to become sales partners in a SSM is similar in process, but different in expenses for most marketplaces.

All marketplaces require the supplier to register with detailed information on the registered person as representative of the supplying party acting as developer. From this process step, suppliers then must sign up for the sales program, assigning one developer to be responsible for the content supplied.

Most marketplaces have one combined legal document for developers and sales to act as a contract. Apple and Samsung have very detailed descriptions of liability, waivers, responsibilities and legal concerns, beyond other competitors. Apple furthermore presents a nondisclosure and noncompetition section, limiting developers to discuss problems related to the products in and submitted for the SSM.

The expenses software suppliers have to make to sell content in a SSM differ a lot and are presented in table 11. Samsung, GetJar, Mobango and PocketGear require no registration costs, a one time or recurring fee to be able to sell in the marketplace. However, PocketGear has lower payout in revenue share, which could be the reason for this choice.

	Registration Costs	Submission Costs	Additional Costs
Apple[a]	€ 79	-	-
RIM[b]	-	$200 / 10 apps	Auditing costs
Nokia[c]	€ 50	-	CA certificate
Samsung[d]	-	-	CA certificate
Google[e]	$25	-	-
Microsoft[f]	€ 79	$99 / app	CA certifica□e
GetJar[g]	-	-	Promotion costs
Mobango[h]	-	-	Promotion costs
PocketGear[i]	-	-	-
SlideME[j]	$0□$20	-	Credit Card ownership

Table 11: Expenses related to the registration process
[a] [Apple, 2010e], [b][Research In Motion, 2010c], [c][Nokia, 2010a], [d][Samsung, 2010b], [e][Google, 2010b], [f][Microsoft Corporation, 2010a], [g][GetJar Networks Ltd., 2010a], [h][Mobango., 2010a], [i][PocketGear, 2010c], [j][SlideME, 2010a]

RIM has a registration fee that is related to the costs of submitting applications to the marketplace. With a minimum of 10 application submissions, software suppliers can buy their right to sell in the marketplace at $20 per application. The number of 10 application submissions might seem high, although a typical submission for one application requires three different packaged versions related to OS versions, which consume one submission fee each. Updating an application also consumes one submission fee, per packaged version. Submitting expenses for one application add up to at least $60, to become available in the SSM of RIM. Additional costs may occur when RIM requires an audit for software supplier bookkeeping. Audits have a maximum fee of $10.000,-, need to be paid in advance and can occur twice a year.

SlideME has no registration fee, but costs for registration can occur when software suppliers opt for an account with a special SlideME credit card that has lower payout transaction percentages than other payout options.

Microsoft requires not only registration costs for the software supplier to participate in the SSM, every submission is accompanied with a $99 handling fee. Furthermore, Microsoft requires software suppliers to have a certificate of authenticity, along with Nokia and Samsung. To obtain the certificate, minimum expenses of €475 are to be made with a third party such as VeriSign. Each submission of software requires a signed document, where a signing fee from €12,50 per signing is incurred [VeriSign, 2010].

Additional but optional expenses are expected in the SSMs of Mobango and GetJar, where software suppliers can buy promotional campaigns for their products.

Zhai et al. (2009) researched B2B electronic markets and concluded that connection costs should be kept low to attract participants. The supply process is a B2B relationship, from where can be concluded that the different approaches of SSM owner registration costs are likely to be affected equally.

4.4.5 Content Submission

When a software supplier is registered as a developer and signed up as a sales partner, there are multiple steps necessary until software is available in the marketplace. The process steps for all cases are displayed in figure x. These submit processes are first discussed, after which two content related issues are presented: content removal and quality assurance.

Submit process

In figure 19, the submission processes from start to end is displayed, where selling content is the end point. The SSM of PocketGear and GetJar are mentioned multiple times; this is related to the content that is available on multiple platforms, where the SSM owner requires specific submission steps which are discussed per type. As mentioned before, all SSM submission processes have a basic requirement of registration and signing up for a seller account.

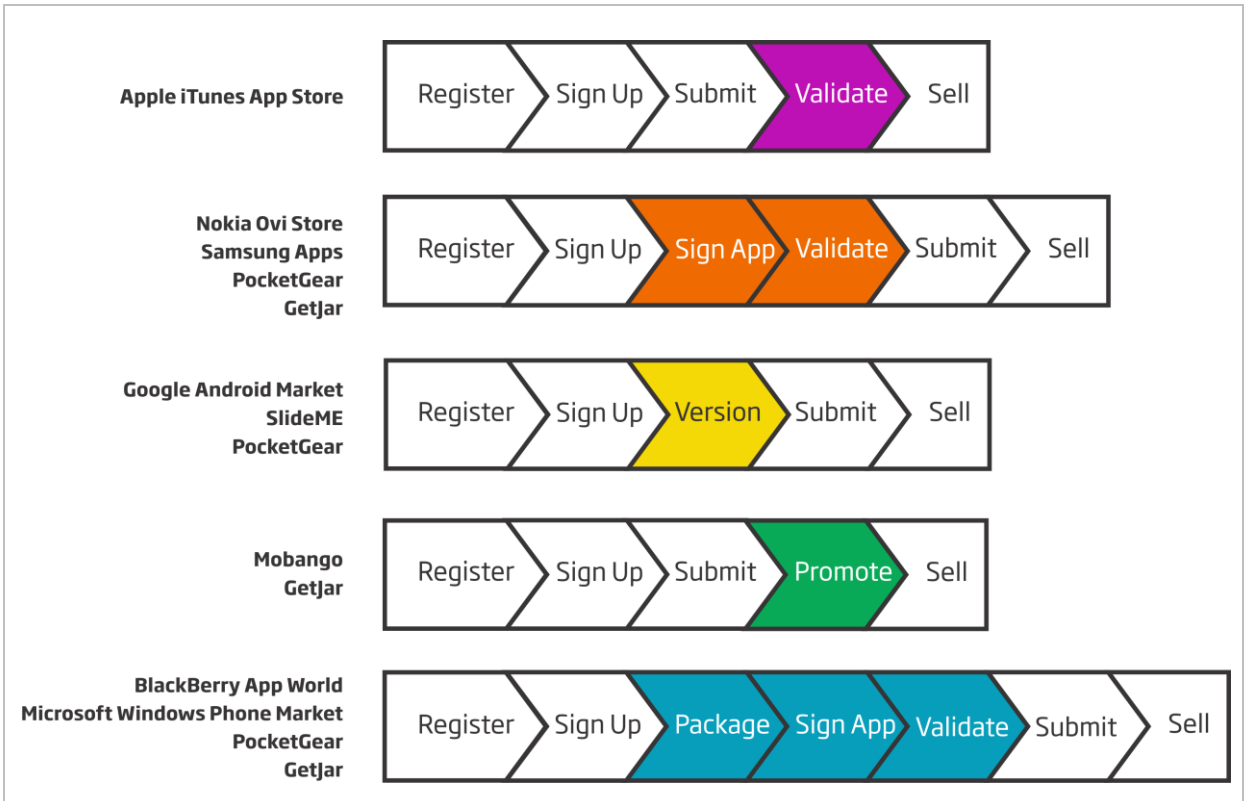

Figure 19: Submit processes for SSM based on OS.
[Apple, 2010e], [Research In Motion, 2010c], [Nokia, 2010a], [Samsung, 2010b], [Google, 2010b], [Microsoft Corporation, 2010a], [GetJar Networks Ltd., 2010a], [Mobango., 2010a], [PocketGear, 2010c], [SlideME, 2010a]

The process step of the actual submission of content is accompanied with information about the product, such as a product description, image, contact information, price determination and category definition. This step is equal for each SSM, where Mobango and GetJar do not require the price determination, but the type definition of free software submitted is required.

Special steps are highlighted in figure x. Apple validates software for iOS after submission to the system. Apple then determines with the use of a validation service if the product is suitable for sales in the SSM. Failing to comply with predetermined requirements results in rejection for the SSM. The validation process can take up to eight business weeks.

Before software for the Symbian OS is accepted for submission in the stores of Nokia, Samsung, PocketGear and GetJar, applications need to be signed and validated. The signing is necessary to establish who designed the software and validation is necessary to assure that the software contains no possibilities to take advantage or cause harm to the users' device. Signing certificates and validation are obtained from different third parties, and can take up to eight business weeks with a 4 week minimum for validation. Validation by third parties requires additional expenses. Without signing and validation, content is rejected for the SSM

For the Android OS, content requires definition of what versions are able to run the software, based on OS version and device specifications as screen pixel density. Without this description of the version in the code of the content, the SSM will not list the content as available for download although it is present in the marketplace. Google, SlideME and PocketGear provide software for Android OS.,

Mobango and GetJar have an additional step after submission, for promotion of the software. This is directly related to the business model of the marketplace, but optional for software suppliers.

The SSM process for submitting software for RIM, Microsoft, PocketGear and GetJar for the BlackBerry OS and / or Windows Mobile OS contains the same signing and validation steps as for the Symbian OS described before. Additionally, a packaging process step is necessary, where software is packaged for a specific device and OS version. For example, a BlackBerry Storm II could have three different versions of the BlackBerry OS at any time in the market, requiring for this device three different packaged versions. This particular smartphone is only one product in the range of smartphones manufactured by RIM.

The above described process steps present features that are part of controlling content quality for the marketplace. The steps can reduce or increase software supplier costs for sales, which are related to market entry costs. Furthermore, the packaging and versioning steps are fragmentation issues.

Directly related to the research mentioned in the foregoing section by Zhai et al. (2009), adoption is related to connection costs, which should be kept low. SSM systems that are based on older operating system designs have higher connection costs than SSM based on

newer operating system designs (iOS, Android and Maemo), which have resulted in quick adoption for iOS and Android.

Content removal

Nearly all marketplaces have the possibility to remove content from the market. Some have the possibility to remove it from user devices when deemed necessary. An overview of removal and reasons for removal is presented in table 12.

	Removal from market	Removal from device	Refunds	Private API	Public API	Guidelines
Apple[a]	Yes	Yes	Yes	Yes	No	Strict
RIM[b]	Yes	X	-	Yes	Yes	Strict
Nokia[c]	Yes	-	-	Yes	Yes	Medium
Samsung[d]	Yes	-	-	Yes	-	Strict
Google[e]	Yes	X	Yes	Yes	Yes	Medium
Microsoft[f]	Yes	-	-	Yes	No	Strict
GetJar[g]	Yes	-	-	Yes	Yes	Low
Mobango[h]	Yes	-	-	-	-	Low
PocketGear[i]	Yes	-	Yes	-	-	Medium
SlideME[j]	Yes	X	Yes	-	-	Low

Table 12: Market owner quality assurance measures
[a] [Apple, 2010e], [b][Research In Motion, 2010c], [c][Nokia, 2010a], [d][Samsung, 2010b], [e][Google, 2010b], [f][Microsoft Corporation, 2010a], [g][GetJar Networks Ltd., 2010a], [h][Mobango., 2010a], [i][PocketGear, 2010c], [j][SlideME, 2010a]

Removal from the SSM is the process of removing the product from the catalogue and made unavailable for consumption. Apple can actively remove content remotely from consumer devices, whereas RIM, Google and SlideME have license servers that can revoke user rights for software use, marked with X.

Refunds are available in the SSM of Apple, Google, PocketGear and SlideME. All of the mentioned refund marketplaces have clauses in the TOS that will remove software from the catalogue when many refunds are issued. Thresholds are not given.

All but Mobango, PocketGear and SlideME have private Application Programming Interface(s) (API) that allow for extra functions to be used for designing software, such as advertising solutions. Apple and Microsoft prohibit the use of public APIs.

SSM systems can have strict, medium or low guidelines which result in removed software. Strict guidelines define in detail what can and cannot be done, in programming, content and other domains, such as trademark use. This affects not only the market presence but also can result in rejection in the submission process mentioned in the previous section.

Samsung has a strange clausule that when a preferred partner is offering a competing product, your product may be pulled from the market. Furthermore, submitting applications to the SSM of Samsung means that a supplier shares all technical advancements with Samsung and preferred partners, possibly damaging intellectual property.

The high control on content inflow as presented in the SSM of Apple and RIM seem to reflect a seller focused market [Zhai et al. 2009], but is contradicted by guidelines focusing on low seller prices.

Quality Assurance

All studied cases that manufacture or design operating systems (Apple, RIM, Google, Microsoft, Nokia and Samsung) provide in Software Development Kits with libraries and protocols for improving software quality. Furthermore, software suppliers are able to discuss in private message board systems for these SSM owners.

The presented tools for software suppliers relate to barriers of B2B system adoption as discussed by Standing, Standing & Love, (2010). The tools help in resolving technilogical compatibility issues and expected versus realized benefits of adoption.

4.5 Conclusion

In this chapter, the cases from the case study are cross examined and discussed using the literature as presented in chapter 2. The cross examination shows that there are clear differences in approach distinguishable between SSM configurations.

On business models, SSM design is focused on generating revenues from suppliers. This can be obtained from payment percentages, payout percentages or promotions bought by suppliers. Competing SSM designs have significant differences in respect to market figures.

The value network as presented in section 4.2 gives a detailed insight in what actors are related to which processes that generate revenue. By comparing the different configurations of the researched cases, the span of control for each SSM owner is determined. Issues determined by research conducted by Haaker et al. (2007) and Chesbrough (2007) show that these differences are tightly related to revenue created by an SSM. Buyer focused markets are more likely to fail, according to Zhai et al. (2009), although the current designs of SSMs resemble such a design and can be successful.

The internal processes show a general approach in payout shares, but a wide variety in pricing strategies for suppliers, allowing for segmentation. Worldwide payment options are not always available in a SSM which can limit buyer adoption. The model as presented by Müller (2005) handles payments direct from buyer to seller, where in the case of SSM payments are indirect, for reasons as refunds, minimum payout amount and payout periods. Reputation systems are found and used in SSM as an information asymmetry reducing mechanic, but are susceptible of having similar limitations as identified for electronic auction market research. Codifiability of products is trivial, which requires systems that can capture the right level of information from suppliers.

External processes for matching, payment and submitting software for sales show different approaches for SSM owners based on the content, market design and value network span of control. The right codification of products leading to end users finding relevant content can lower search costs, allowing for more transactions that improve market efficiency. More payment options allows for more consumers to consume products, where differences are shown in the possibility to abort a transaction. Becoming

a seller in the SSM is, depending on the OS, more or less difficult and costly. Fragmentation is a topic that increases submission costs, potentially lowering adoption by suppliers.

5 Conclusions

In this chapter, the research findings and their limitations are discussed by answering the hypothesis from chapter 1. Furthermore, the implications of this research are presented for theory and practice. Finally, multiple topics that relate to the findings for further research are discussed.

5.1 Research Findings

For the case study research design, the model as presented by Müller (2005) has been applied. From the cases included in this research, the model is presented is applicable for Smartphone Software Markets after modification for payment. Further discussion on the model is presented in section 5.2.

On open and closed business models [Chesbrough, 2007, 2009] there is a discussion possible on which model is more effective or efficient. Apple currently is the largest SSM in numbers and payout level, being a closed business model. Google's SSM is growing rapidly, adopting an open business model. Although the open business model design is showing high adoption for developers and hardware producers, there is a possibility that the market efficiency is threatened by the workings of the SSM. By not controlling SSM content by focusing on quality of content and codification of product, price dispersion and information equivocality can lead to the exit of high quality suppliers. The current open model design shows a lack of leadership, threatening the model's success. The demand side of the business model needs less focus, as this will lead to price justification of quality content directly benefiting market efficiency. One nuance in relation to demand for SSM created by end users is presented by Moons (2010): "End users do not know the difference between operating systems, that is why we developed our own user interface, HTC Sense, for all operating systems we sell". The quote shows that device manufacturers use an OS as a possibility to differentiate, but this is in combination with hardware and customization, where end users have difficulty understanding the differences and implications for all levels of smartphone design. This is further highlighted in research literature findings, showing the multiple levels of complexity for electronic marketplaces in relation to product offerings. By the displayed results in the cross case analysis, one additional finding of this case study.

The end user is the only source of revenues in the SSM industry and requires the full attention in designing services. From this insight, it can be concluded that the focus should be on the user experience, which is adapted to the maximum in the closed approach by Apple. The approach is furthermore designed in such a way that a premium can be charged on all levels for all relating parties and secured with multiple lock-in strategies. The closed design is hard to imitate, making direct competition difficult. By this closed design, consumers know what to expect of the product, whereas suppliers know that trade can be profitable. This confirms the hypothesis from chapter 1:

A smartphone software market benefits from a closed market configuration which improves demand and supply adoption leading to critical mass.

The competitive position of a SSM can be influenced by managing market efficiency, partially by using standards that are open to increase supply adoption. By managing the

content portfolio through controlling input for quality and improving matching mechanisms suited for small screen browsing, the revenue providing customer can be attracted. However, competition is only possible by differentiation, whereas current SSM owners show bandwagon effects that are driven by imitation rather than differentiation. To aid in the differentiation effort and directly influence market efficiency, a review of current reputation systems is suggested. Using lock-in techniques then can bind customers to a specific SSM.

From the case study results with regard to control in value network, submission processes and operating systems, it can be concluded that there are multiple levels of vendor lock-in possible and applied by SSM owners. Table 13 shows on network, device and application level the lock-in for each case. A 'Yes' in this table means that the SSM owner designed lock-in features that make switching costs for end users high. The network level is predetermined by Apple in having exclusive contracts with network operators to create an additional revenue stream. On device level, Apple is offering one product, where other SSM owners offer multiple options, apply no lock-in or have no influence. On application level, all SSM owners that manufacture an OS design lock-in. RIM, Google and SlideME have lock-in through licensing services. Depending on product offerings in the SSM, lock-in occurs for all cases with regard to multiple operating system content sales.

	Network	Device	Applications
Apple	Yes	Yes	Yes
RIM	-	Some	Yes
Nokia	-	Some	Some
Samsung	-	-	Some
Google	-	Some	Yes
Microsoft	-	-	Yes
GetJar	-	-	Some
Mobango	-	-	Some
PocketGear	-	-	Some
SlideME	-	-	Yes

Table 13: Levels of Lock-In per SSM owner

5.2 Theoretical Implications

From the researched cases, the following adaption for the process model for digitally documented knowledge by Müller (2005) in relation to a SSM is presented in figure 20. The payment process for SSM is indirect, in contrast to the original model. The model has been adapted to reflect the current state of a SSM. Furthermore, the general descriptions of E-marketplace processes have been replaced with the SSM specific processes.

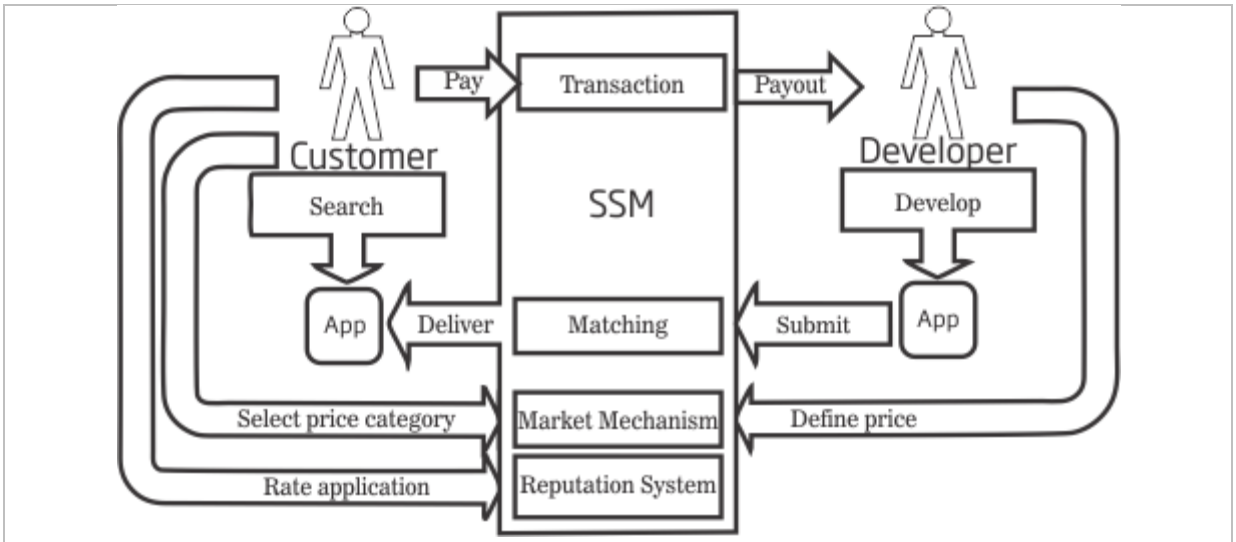

Figure 20: Adapted process model of Müller (2005) for SSM research

The STOF model of Bouwman et al. (2008) is used to analyse current business models, as opposed to creating business models, which is a new approach. The vastness of the areas covered by the STOF model make SSM research complexity manageable without losing focus on influences presented by the research context intricacy.

From the combination of the model by Müller (2005), the analysis used with the STOF model of Bouwman et al. (2008) and the application of the E3 value model by Gordijn & Akkermans (2001), the value network for SSM is modeled as presented in figure 15, section 4.2.

The conclusions drawn from the case study for open business models concur with findings of De Reuver (2009) regarding governance in co-evolving value networks. The open business model resembles in cases of SSM a trust based design, where closed models see leadership in authority based models, but in the commercial phase it is unclear which model is most efficient. However, indications from this case study show that with open models the trust based design can help adoption leading to installed base growth, increasing the supply side interest. Unfortunately, this development lacks leadership, which deteriorates the focus on quality which customers expect from expensive products.

5.3 Practical Implications

The practical implications for business are closely related to the research findings. The topics that need focus are efficiency for input and output processes, differentiation and quality content. For input processes, submitting software while maintaining quality should be the main consideration for attracting small software developing companies. The market benefits from differentiation by increasing a compelling product offering for consumers while charging a premium for quality. To allow this premium to be transferred as effortless as possible, the payment process steps and opportunities of aborting the process should be minimized.

The practical implications for supply and demand are different. Software suppliers and end users should focus on keeping switching costs as low as possible by minimizing

entrenchment. Whenever possible, the choice should be focused on keeping options for the future.

5.4 Further Research

The unit of analysis being SSM was deliberately focused, as there are other marketplaces for electronic content such as portable gaming devices or touch screen computers. The applicability and limitations of the model presented by Müller (2005) for such marketplaces or marketplaces more dedicated to hedonic content is a good starting point.

Suggestions for further research topics are displayed in figure 21 and are highlighted in red.

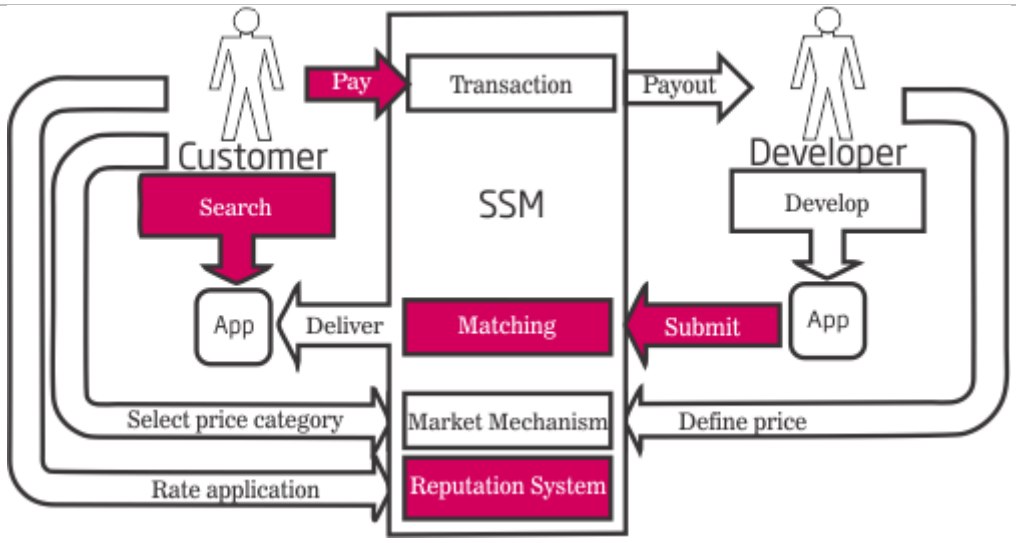

Figure 21: Topics for suggested further research

Current electronic marketplace literature is focused towards auctioning systems and non-mobile marketplaces [Standing, Standing & Love, 2010]. The topic of SSM is one of the few mobile transactions with instant consumption configurations. To maximize market efficiency research, the following subjects are considered:

Payment method adoption

Payment methods for SSM are important, but experience difficulties in their process because of the interaction with third parties where transactions can be interrupted or aborted. How can the ease of use be improved for such payments? There might be indications from the value network representation that further integration of network roles can aid in this process.

Matching & Searching

As indicated by multiple findings in Standing, Standing & Love (2010), matching end user demand to available relevant content is a challenge, although electronic marketplaces enable for multiple suppliers to enter the market. Smartphones have limited screen sizes, making the browsing of large software catalogues inefficient. How search queries can be optimized for displaying relevant results and interface design maximizing these results are likely to influence efficiency. By using customer profiling and segmentation with

different approaches as discussed by Yankelovich & Meer (2006), market efficiency can be improved and user search costs lowered.

Submission process

Submission processes with reduced 3rd party interaction are found to attract more developers in this research. How to keep quality high for submitted content whilst focusing on adoption on open standards for content creation would be a practical ad theoretical challenge.

Reputation systems

The current focus of reputation systems in SSM is on the product that is rated, on a low level. Where long and motivated user reviews are difficult to enter using smartphones, an alternative system using multi criteria decision analysis tools could be designed. By splitting up different aspects of the product and developer, a more robust insight on product performance is possible, without large demands towards the rating user.

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Appendix 1: Case Study Protocol

Company information

Company Name : [name]
Company residence : [country]
Company revenue (2009) : [revenue in $]
Company structure : Private / Public [Ltd., Corp., Inc., other]
Company products : [product descriptions]
Company segment : [segment]
Company clients : Business / Consumer / Both [percentages]

Market information

Market name : [name]
Market start : [year]
Market content : Hedonistic / Utilitarian / Both / Other:
Market size : [number]
# of developers : [number]
# of downloads : [number]
# of countries : [number]
Currencies : [$ / € / £ / ¥ / other]
Payment type : Paid / Advertised / Free / Other:
Area segmentation : [yes /no]
Other remarks : [Information]

Developer processes

- Terms of Service
  - Process requirements for submission
  - 3rd party interventions
  - Termination causes
  - Content limitations
  - Liability
- Payout
  - Payout period [weekly, monthly, quarterly, annually]
  - Payout threshold [minimum revenues]
  - Deductions
  - Taxes
  - Required additional issues
- Refunds
  - Refund means
  - Cooldown period
  - Dispute methodology
- Other remarks

Consumer processes

- Terms & Conditions
    - Availability
    - Re-installing
    - Payment methods
    - Refunds
    - Limitations
    - Liability
- EULA
    - Content use
    - Dispute settlement
- Payment
    - Payment activation
    - Deposited fund withdrawal
- Returns
    - Complaint form
    - Eligibility
    - Cash refund or creditation
- Other remarks

Internal processes

- Searching
    - Paid
    - Sponsored
    - Free
    - Other mechanics
- Portfolio management
    - Pricing
    - Area segmentation
    - Product description
    - Sales tracking
    - Advertisement selection
- Feedback
    - Rating
    - Review
- Other remarks

Appendix 2: Value Network Transactions

E3 Value Network Relations	Money	Virtual Goods	Information

Value Stream 1	Obtaining software applications			
Actor	**In**	**Out**	**Co-Actor**	**Comment**
User	Software	Money	Marketplace Engineer	
User	Software	Information	Marketplace Engineer	
Advertisement Broker	Information	Information	Marketplace Engineer	
Advertisement Broker	Money	Information	Marketplace Engineer	
Payment Broker	Money	Information	Marketplace Engineer	Dashed
	Revenue Share	Information	Software developer	
Marketplace Engineer	Software	Money	Software developer	
Marketplace Engineer	Software	Information	Software developer	
	Software	Description	Software developer	Dashed
Marketplace Engineer	License	Money	OS Manufacturer	
Marketplace Engineer	License	Information	OS Manufacturer	
Marketplace Engineer	Software	Money	Software distributor	
Marketplace Engineer	Software	Information	Software distributor	
	Software	Description	Software distributor	Dashed
OS Manufacturer	Money	License	Testing & Verification partner	Dashed
Software Developer	Money	Software	Software distributor	
Software Developer	Information	Software	Software distributor	
Software Developer	License	Money	Signing partner	Dashed
Software Developer	License	Money	Testing & Verification partner	Dashed
	Verification	License	Testing & Verification partner	Dashed
Software Developer	Content	Money	Content Provider	
Software Developer	Content	Information	Content Provider	

Value Stream 2	Getting Connected			
Actor	**In**	**Out**	**Co-Actor**	**Comment**
User	Connection	Money	Network Operator	

Value Stream 1: Obtaining Software Applications

Paid applications: The user buys an application with money from the marketplace. The money is transferred via a payment broker from the user to the marketplace.

Free or Sponsored applications: The user downloads an application for free from the marketplace. The user sees advertisements and delivers personal information in exchange for the application.

The money or information in the marketplace is exchanged for software from software developers or software distributors. Software developers or software distributors receive a share of the payments made to the Marketplace engineer. Software developers or distributors supply information on the product.

Money is used to obtain a license for the marketplace engineer from the operating system manufacturer.

The market engineer pays the payment broker for payment information on transactions.

The advertisement broker pays with money, submits advertisements and receives end user information from the market engineer.

The software distributor obtains software from software developers or content from content providers to sell in the marketplace for money or information.

The software developer sells software in the marketplace or to software distributors for information or money. The software developer buys content with money or shares information with content providers. The software developer buys a license to sign the software from the signing partner with money. The software made by a software developer is tested and verified by a verification and testing partner for money.

The testing and verification partner is licensed by the operation system manufacturer for money.

Value Stream 2: Getting connected

The user buys a connection subscription with money from a network operator. The network operator delivers the connection service for money.