On the Facets of Stakeholder Inertia: A Literature Review

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Abstract— **Intense competition in rapidly changing markets puts intense pressure on product definition and the associated requirements engineering processes. An extensive literature review has identified that brand inertia, customer inertia, inappropriate market entry strategies and an inability to satisfy customer needs or expectations are the principle contributors to customer product rejection. While RE practice has developed a number of methodologies for addressing aspects of the contributing factors to these failures, very little prior work has focused on the inertia aspects of the problem. In this work we present the results of our literature review and build upon this review to develop an initial framework for incorporating stakeholder inertia into RE practice and management processes. We conclude with a detailed agenda for further research into aspects of the stakeholder inertia problem.**

I. Introduction - Why Are Products Continuously Evolving… and Failing?

Today, more than ever, consumers are being introduced to new products at a rapid pace [1][2][3][4]. Even though there is a substantial failure rate of new products in the market [3][5], this doesn't affect the rate in which new products are being made available to the market. This has to do with the markets companies compete in, as in competitive markets companies need to differentiate their product offering continuously from competing products in order to survive [6][7][12]. New features are many times the main attraction that persuades a consumer to buy a new and improved product; product innovation is the lifeblood of firms competing in changing environments [6]. In market-driven contexts [12], the customers decide about the success or failure of the offered products and indirectly grade the quality and efficiency of the requirements engineering efforts.

This mean that in mature markets companies must develop new products faster, cheaper and better over time [6][8]. Thus innovation has become a top priority in a substantial number of companies. The Boston Consulting Group senior executive innovation survey showed that innovation was among the top three priorities for 71% of the companies and 70% considered new-to-the-world products as important or very important [6]. Innovation has good effects as it is shown that the stock market responds rapidly and positively to announcements about innovation [8]. Thus rapid technological development continues to spur technological-based innovation [2].

The types of change can either be evolutionary or revolutionary, where evolutionary innovation does not have to always be innovative to the industry, *e.g.* Windows Vista introduced features that were already presented in Mac OS X [9]. Evolutionary innovation can be seen as continuations of existing products. Revolutionary innovations are so different that they cannot be compared to any existing practices or perceptions available at the time, as they often use new technology, launch entirely novel products or services and often create new markets [9]. This means that revolutionary innovation development provides for the development and commercialization of unprecedented performance benefits and abilities to create new businesses [1][2][3]. It has also been shown that revolutionary innovation enables companies to experience little or no competition in the market [3] yet only 12% of launched innovations were identified as revolutionary innovations [13].

Unfortunately, the rapid introduction of new and improved product versions can make customers regret a previous purchase, hesitate over any new purchases or agonize over similar purchases in the future. [7]. The speed of innovation has also made the consumers' decision making process more complex, they do not only have to figure out what to buy but also when it's best to buy [2][7].

Customer inertia is defined as the unfavorable reaction of the consumers in the market towards a product containing innovative component(s) that introduce a noticeable change in one or many of the following product dimensions. Based on the Section III literature review, customer inertia involves the following components:

- Relative advantage – how noticeable the advantage of the new product is in comparison to the already existing products
- Complexity – the complexity of the product and how it is related to the uncertainty
- Compatibility – how seamlessly the new product integrates with the existing context and
- Infrastructure - including the actual use of the product by the consumers.

The change introduced gives rise to noticeable switching costs [31] that deter the consumer from adopting the novelty

offered. The degree of customer inertia varies with the degree and type of innovation introduced which, in turn, affects the adaptation pace.

In this short paper, we focus on stakeholder inertia in requirements engineering with the goal of understanding its comprehension, role and impact on requirements engineering methods and processes. We expand our previous publication [32] about the effect of stakeholder inertia on product management by focusing on requirements engineering and management.

Stakeholder inertia is defined as the tension present between change associated with innovation and the tendency to resist such change. The tension's magnitude varies with the nature and degree of innovation and is hypothesized to be smaller when the degree of innovation is small (incremental innovation) and larger when the degree of innovation is substantial (radical innovation).

Stakeholder inertia addresses the degree of customer inertia and organizational inertia involved with the innovative change in a product being developed. Whereas the degree of customer inertia directly affects the market acceptance of the proposed product, organizational inertia affects the company's willingness to develop the proposed product.

Customer inertia is defined as the unfavorable reaction of the consumers in the market towards a product containing innovative component(s) that introduce a noticeable change in one or many of the following product dimensions: relative advantage, complexity, compatibility, quality or performance.

The change introduced gives rise to noticeable switching costs that deter the consumer from adopting the novelty offered. The degree of customer inertia varies with the degree and type of innovation introduced which in turn affects the adaptation pace.

We review the literature in requirements engineering, product marketing and software business for evidence as to how to manage stakeholder inertia. Our main hypothesis is that stakeholder inertia has significant impact on market acceptance and thus on requirements engineering. We focus on the following research question:

> What dimensions of inertia are discussed in the requirements engineering, product marketing and software business literature?

This paper is structured as follows. Section II provides the literature review methodology while Section III outlines and discusses the literature review results. The roadmap for future research activities and our conclusions are presented in Section IV.

II. Literature Review Methodology

We have used a mixed approach for this literature review rather than the systematic literature review guidelines available in the literature. Due to the multidisciplinary nature of stakeholder inertia, we assumed that database searches may not be sufficient for this literature review. Therefore, we manually reviewed titles and abstracts of the selected journals and conferences, performed traditional database searches and also reviewed the references of the papers identified by this process. The findings were iteratively discussed between the authors and disagreements were resolved during the process.

The search for stakeholder inertia within requirements engineering yielded few results. Therefore, we focused on identifying what reasons the literature identified as factors causing a product to fail in the marketplace. The initial searches showed very little promise, yet the few that seemed interesting either came from the Requirements Engineering Journal or the IEEE International Requirements Engineering conference. It was thus decided that a thorough manual article search of both sources should be conducted, wherein the abstracts of all articles were screened for keywords. To better understand the underlying causes of costumer inertia, two marketing books [9][15] were reviewed in order to find keywords for further searches using the Engineeringvillage search engine. Long search queries gave very limited results; short queries were used with a process of systematically excluding vocabulary in order to refine the results to exclude papers addressing unrelated topics.

Reviewing the Requirements Engineering journal and International Requirements Engineering conference with the following keywords:

> *"RE and innovation; RE and stakeholder acceptance; RE and market uncertainty; RE and market resistance; RE and product failures"*

identified 14 directly related articles and 35 promising articles.

Next, we conducted database search in the Engineering Village database with the following search string:

> *"Market resistance; market uncertainty, adoption of innovation; stakeholder satisfaction; new market launch; market acceptance; customer satisfaction; innovation diffusion; switching cost"*.

which 17 directly related articles and 386 promising articles. As a last step, we explored the references of the directly related articles using the snowballing method [34] – one iteration of reading the references identified an additional 2 related articles and 12 promising articles[1].

III. Literature Review Results

In reviewing the literature, four main causes for why some products were not accepted could be identified. These were:

1. *Brand inertia*, which is related to how easily customers are willing to switch brands [10].
2. *Resistance to change* which is related to how easily customers are willing to accept changes [4].
3. *The products inability to satisfy users'/customers' needs*/expectations [8].
4. *Wrong strategies* chosen by companies leading to products failing [5][11][12].

[1] The full list of the identified in this study is available at https://serg.cs.lth.se/fileadmin/serg/TheListOfPapers.pdf

Each main cause in turn can have many underlying contributing factors that determine the destiny of the product.

A. Brand Inertia

Brand inertia, or how customer willingness to switch to another brand [10], shows that there is a correlation between brand inertia and market experience when it came to computers. Further, past experience with products of a brand seems to affect the decision whether products from the same brand would be bought again: if past experience with the products was favorable then the consumers would want to buy the same brand again, otherwise they were inclined to switch brands.

The identified article [10] suggested that market experience had an effect on inertia, *e.g.* the more computers owned of a particular brand the higher the likelihood to stay with the same brand, implying higher switching costs. Furthermore, if experienced consumers decide to switch brands anyway then they were more likely to buy obscure brands for their perceived risk was lowered with increased market experience. A good example here is Apple that offers computers, music equipment, TV received, storage and cloud solutions and mobile phones that all "work together" and in this way increase the brand inertia towards their competitors. However, planning or analysis based on this strategy is currently absent in the requirements engineering and software product management literature. Thus, we postulate to augment requirements engineering and software product management processes with steps or methods that support incorporating brand inertia analysis into the product planning decision making. This analysis is particularly important for new products or market segments.

B. Resistance to Change (Customer Inertia)

Resistance to change is attributed to stubbornness, price or familiarity with established technology [4]. For the consumer it may be perceived cheaper to stick with the old technology. Familiarity with another product and technology means there is learning resistance as a result of the new technology pointing again to switching costs being a factor as in [10]. Apart from this, social influences were also articulated as a factor and, more precisely, the imitation of others: If customers buy a product, then others who haven't are more inclined to also buy it [4]. A resistance to purchase by the consumers can therefore have unwanted effects like negative opinions spread by word of mouth [11], further lowering the possibility of acceptance. For business products that require extensive training, the resistance to change may also be negatively impacting the purchase decision (current software product revenue models often include significant training and maintenance fees). The company purchasing software may want to stay with the current version to avoid these additional costs and reduced efficiency while users learn the new tool, *etc.* The introduction of the ribbon feature in MS Office is a clear example how innovation may generate additional learning costs and thus resistance from the corporate customers' perspective[2].

Another important factor seems to be uncertainty. There is considerable uncertainty associated with characterizing the type of consumer needs that can be satisfied by a new technology [1]. Because of such a high level of uncertainty, marketers face two challenges – identifying the optimal functionality for the new technology and the need to effectively communicate with consumers to reduce the uncertainties involved with the new product [1]. Another study found that newness, risk and uncertainty were major barriers to adaptation [3]. Requirements scoping and product-line literature does not focus on this aspect of setting the scope of the projects.

Everet Roger's framework for innovation diffusion has identified five factors affecting customer likelihood of adoption, and thus product acceptance [9].

- *Relative advantage* which relates to the benefits for the consumer of adopting the product compared to cost and alternatives available.
- *Compatibility* related to the extent to which using the product is on existing ways of doing things and established norms.
- *Complexity* related to how difficult it is to use the new product.
- *Trial-ability* related to how much the product can be tested before having to be bought.
- *Observability* related to how easy it is for the consumer to observe the benefits of the product.

Although these characteristics have been identified for the explanation of the adoption rate, the meta-analysis of them showed that the effects of observability and trial-ability are weak and many subsequent studies have disregarded them as innovation characteristics [3]. Interestingly, stakeholder inertia was not considered among these factors. However, Roger defines five types of customer personalities, some of them are open to innovations (innovators, early adopters) while others are reluctant or even adverse to innovations.

Some studies looked at what causes doubt instead of acceptance. One study confirmed that compatibility and relative advantage factors are important [3]. However other factors, absent in the traditional innovation literature, were also identified: the money component, users are more aware of where they put their money, the durability of the product [3], and aesthetic appeal, consumers want to look good with their product [3]. That role of aesthetic appeal was also confirmed by a study carried out on car sales in Germany [14]. A good example here is Apple that keeps their aesthetic appeal unchanged for their product and in this way decreases the inertia against new versions of the products.

Traditionally it was thought that consumers' unwillingness to adopt innovation had to do with lack of

[2] http://archive.today/fV9G

product understanding [7]. This still seems to be the case and seems to be associated with product's complexity. One of the identified studies advocated that, for complex products, the competitive advantage, cost-value ratio and the technical specifications are difficult to observe and be understood by the consumers [11]. Thus, requirements engineering and product management risk analysis steps should be extended by some of the uncertainty analysis that explicitly investigates inertia.

C. The Product's Inability to Satisfy Users'/Customers' Needs/Expectations

It has been reported that failure rates of information system are still very high due to user dissatisfaction [17]. To better understand the underlying factors for satisfaction, it is presented from a marketing perspective first, then factors in requirements engineering are presented.

Customer satisfaction is related to the value proposition, what is promised by the company to be delivered to customers in order to satisfy their needs [15]. Value as a decision making driver is less frequently used in requirements engineering and software product management literature as most methods focus on cost or priorities. However, in marketing the relationship between value proposition and customer satisfaction is usually described as in [15]:

- If product performance meets customer expectations, then the customer is satisfied.
- If the product over performs customer expectations, then the customer is delighted.
- If the product underperforms customer expectations, then the customer is not satisfied.

This suggests that satisfaction depends on the product's perceived performance relative to customer expectations, which in turn are affected by the value proposition. However, literature in quality requirements does not explicitly focus on this aspect [12][16][33]. This knowledge can be used by marketers to achieve better response from the market *e.g.* to deliver perceived performance that exceeds that which was promised resulting in improved customer satisfaction [15].

The visibility of user satisfaction also depends on the project type. In bespoke projects, the customer and users are most often known and the success of a project is measured directly by customer satisfaction [12]. Therefore, the ability to control success is greater as customer validation can be planned and easily conducted during the late phases of the project [12].

The situation in market driven projects is different, customer acceptance and satisfaction can't be measured directly. Instead, success is defined by sales, market share or product reviews [12]. It is not easy to validate [12] which increases the risk involved with new product development but, as mentioned previously, market dynamics and time windows force the companies to produce new products to stay competitive and survive [6][7]. Cost estimation and release planning are important activities in market driven product development [12] and, in some cases, the actual users are unknown and traditional requirements engineering elicitation methods do not apply. It appears that product success is currently measured by the amount of perceived innovation rather than taking into consideration the need to minimize the negative effects of customer inertia.

How customers perceive the product's performance is highly related to usability. As usability is strongly related to behavior, there exists a problem as analysts who capture requirements most likely aren't experts in behavioral and usability aspects [16]. The fact that there exists a multitude of usability guidelines (we identified 2394 different guides as of 2013) does not help to find a suitable guideline for the specific system being developed [16]. Usability is also well addressed in requirements engineering but not from the inertia perspective.

There are several factors mentioned in the requirements engineering literature as causal factors in system failures. Therefore these factors are important to consider as contributing factors to the company's inability to satisfy customers.

In the literature, factors like ambiguity [17][19] and missing and incomplete requirements are identified as contributing factors to system failures [18]. Ambiguity is identified as a major factor in customer dissatisfaction and can be seen as a factor for defects. The transition between analysis implementation and taking the informal and making it formal [20] is affected by ambiguity [30] and inaccurate communication [18]. The use of natural text is also highly associated with ambiguity [19]. It is also claimed that ambiguity can never be completely eliminated, as the people involved are working from different perspectives and have different experiences affecting how information is perceived [17].

Among the identified papers we have also found claims that shortcomings in requirements, and later in their implementations, arise because the context in which they operate is not communicated – instead the focus is put on the functionality to be implemented [21]. The requirements elicitation phase also seems to be very error prone [24] in this regard and elicitation remains problematic because of missing or mistaken requirements [25].

Further, there seems to be a problem since requirements analysis does not address adequately the impact of social and organizational matters [22]. The relationship between entities in the system aren't analyzed or sufficiently communicated, preventing improved domain knowledge understanding [18]. This resulted in many models that try to address the shortcomings of requirements elicitation models:

- ARTE – based on activity theory to elicit requirements regarding the human context of a system [21].
- AGORA – using conflicts in preference matrices to detect stakeholder discordances [35].
- HSO – to discover the real needs of potential users and understand their behavior within their work [22].
- Relationship analysis – to determine the relationships between structures in a system.
- Goals Oriented Requirements Engineering (GORE) – organizing goals in hierarchies and using specification models giving further detail for actions, agents, events etc. There are models that extend GORE [25][26], for example:
    - KAOS adds temporal distance [25]
    - i* also deals with softgoals, agent relationships modelled as dependencies. [25]
- Effective communication – to enable discussing requirements in ways that are intelligible to both users and developers [19].
- Ethnography – promising for finding requirements that are valuable but hidden (tacit). However , it has been shown to be very time and labor intensive [27] and in most engineering projects time is critical [23].

Despite many different models available in the requirements engineering literature, the evidence of industrial uptake of these models is limited and information is still often recorded in the form of texts, lists, sketches and simple diagrams [25].

D. Wrong Strategies Chosen by Companies Leading to Product Failure in the Market

In the identified papers, we also discovered that wrong strategies chosen by companies could affect product acceptance in a market. The strategy of innovation in products functionality and interface, showed that if companies innovated in both, the response for these products was affected by imagination [1] and temporal distance [2]. Deployed marketing advertisement programs towards could backfire if they let the consumers imagine the use of a product with innovative functionality and interface (that may not be realistic) uncertainty increased [1]. Not considering the temporal distance between concept testing and market introduction could result in wrongly trusting data recorded in concept tests [2] and lead the company to make sub-optimal decisions. There seems to be an assumption in the surveyed literature that the more innovation the better and products should have as many new features as it is possible.

Culture and nationality also have significant effects on adaptation of technology products [28][29]. In what region a product is launched can therefore have a large effect whether a product fails or not. It was shown in that Nordic Europe better accommodates revolutionary innovations than the Mediterranean countries [29].

How the members in a team eliciting requirements are chosen is also a contributing factor that determines what type of ideas will be generated. Perhaps paradoxically, a lack of domain knowledge among more inexperienced team members can generate a much higher numbers of new ideas that the more experienced members could build upon [25].

Launch strategies also have a significant impact on whether a product is successfully adopted or not. Products often fail due to inflexible launch strategies [5][30], launch strategies should be able to adjust to actual market conditions. Tools and procedures should be in place to frequently evaluate the market conditions and market response; the strategy must be flexible to changes [5]. Feedback analysis is not only important during launch but also after [30]. When executing strategies, the tactics are used are also important. Which diffusion barriers (obstacles for adaptation in the market) are targeted [11] is important and targeting one is often not enough. Instead, targeting a combination of diffusion barriers was the best. Still, there seems to be little research done in incorporating inertia into product launch strategies.

IV. Research Agenda for Stakeholder Inertia

In this paper, we present the results of a literature review of stakeholder inertia in requirements engineering and software product management literature. We identified 33 articles that help to better understand stakeholder inertia and its role in requirements engineering and software product management. Based on these articles and their interpretation, we formulate the following research agenda for stakeholder inertia.

Extending quality requirements elicitation techniques to include inertia should be studied further. Inertia is a complex phenomenon that can present itself as several quality aspects and quality requirements at the same time. Stakeholders seem to have difficulties in articulating new ways of doing things [33]. Perhaps they would find it easier to identify which parts of the system should remain unchanged or only slightly improved (inertia). Similarly, stakeholders may have difficulties in suggesting new solutions, partly due to their resistance to revolutionary changes, and thus suggest only familiar solutions. However, one challenging aspect of this is that customers generally can express these opinions upon questioning but relatively few are able to construct the statements without prompting as they are the consumers of the product not designers of the product.

Stakeholder identification and conflict resolution is another aspect that we would like to highlight for a future research agenda. Some of the inevitable conflicts between stakeholders could be resolved by dividing stakeholders based on their potential inertia and addressing their needs separately. Likewise, when working with stakeholders that have difficulties in expressing their needs or defining new

requirements the focus should be on understanding if the current functional or quality attributes could be improved, and by how much, rather than focusing on generating large quantities of new requirements.

Stakeholder inertia should also be considered when analyzing the speed of innovation. It appears to be logical that one way to overcome extensive inertia is to adjust the pace of innovation to the innovation absorption capacity of the customers of the target market. By doing so, companies may deliver fewer innovations but with better quality and could avoid overwhelming their customers with extensive learning costs (which may prompt them to look for alternatives).

Also, launch strategies could be improved by explicitly considering inertia and preparing their market for increased novelty by marketing campaigns, trial usage and education. Moreover, product planning activities should also involve stakeholder inertia analysis and provide decision support for continuing or discontinuing a product depending on the amount of innovation and resulting stakeholder inertia. Finally, the notion of software brand should be extensively studied and better understood as a mechanism to control stakeholder inertia.

As in any study, this study also has limitations that should be reported and discussed. Firstly, our literature review was conducted using mixed methods and the inherent threats to validity should be discussed. Not adhering to the systematic literature review guidelines may decrease the reliability of the findings. However, due to the interdisciplinary nature of this work, we found it difficult to express the scope of our literature in a single search string that can be executed and processed. Therefore, we opted for a mixed database search and snowball approach, supported by personal recommendations. We are aware that we could have missed some important studies and that our literature review may remain incomplete for some aspects.

Secondly, the reliability of the findings is impacted by the lack of a commonly accepted stakeholder inertia definition. We provide the definitions of both stakeholder and customer inertia in the introduction section but we do not claim that these are the commonly accepted or standard definitions.

Thirdly, we are aware that the suggestions included in the research agenda section are preliminary and should not be considered as complete or exhaustive but further explored in future work.

Fourthly, we are aware that the customers in this work are generalized to a fairly uniform group of passive beings whose purchase decision heuristic is: “what to buy, and when”. As a consequence, the focus of this paper seems to be on step 4 and 5 of Dewey’s buying decision process [36], even though the calculative nature of the consumer in the first three steps of that model is highly relevant to the context of stakeholder/customer inertia and should be considered as influencing factors.

In future work, we plan to focus on deriving a framework for managing stakeholder inertia in requirements engineering and software product management. For requirements engineering, we plan to focus on investigating how current requirements elicitation and analysis techniques could be augmented to capture and analyze stakeholder inertia. Finally, we plan to focus on the first three steps of Dewey’s buying decision process and further explore the customer side of stakeholder inertia.

ACKNOWLEDGMENT

This work is founded by the SYNERGIES project, Swedish National Science Foundation, grant 621-2012-5354.

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