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Recommendation Systems as a Success Factor in On-line Shopping

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***Abstract*: E-commerce enables online shops to be able to compete within a global market scenario. Crucial recommendation systems and success factors enable to build a good business in the Internet and this knowledge may allow reaching an important competitive advantage for its sustainability. As many disciplines are involved through those success factors, it is required an effective coordination so that it is accomplished accurately and through an integrated and collaborative way. The various stakeholders involved on a given business should, therefore, be involved and work together to achieve a high quality product that fully satisfies the end customer needs and wishes. Further, current e-commerce systems continually need to provide personalization when their content is shown. Personalization is a crucial success factor that could be addressed using recommender systems, which make suggestions and provide information about items available in the system. Nowadays, there is a vast amount of methods, including AI (Artificial Intelligence) techniques that can be employed for personalization in recommender systems. An illustrative case study of an on-line shop is used to discuss the latter success factors.**

***Keywords*:** E-commerce; success factors; recommendation, personalization, online shopping support and web platform.

I. Introduction

The e-commerce has emerged as an interesting alternative way of commerce at the same time it has emphasized its relevance to the growing instrumentalization of the web and the intensification of alternative ways of creating value [1]-[3].

Given the existing competitiveness in the nowadays global market context, there is an enhanced need to reach the widest number of customers within particular niche markets. Although e-commerce is already being widely explored there is still considerable margin of growth to its maturity [4].

The application of e-commerce in the context of small and medium enterprises has been a potential vehicle for promoting its value creation. There are a vast number of studies demonstrating the successful implementation of e-commerce, in many industrial sectors, which led to a strong motivation for this work, in order to study the success factors for implementing business through e-commerce, which can greatly be enhanced through recommendation systems.

The recommendation system interaction with the consumer is also of utmost importance. When the consumer interacts with the system, every taken action has meaning and can be used to complete the consumer profile. Nowadays, most systems build the consumer profile implicitly and/or use forms to request feedback.

Thus, through this paper, a study of the whole process of e-commerce, with special focus on critical success factors and recommendation systems is presented and for a better understanding of its content it is organized as follows. Next, on section 2, a brief description of the market behind e-commerce is presented. On section 3 a summarized view about the e-commerce's state of the art is included; and section 4 describes the main success factors to be considered when putting forward an on-line shop. Next, section 5 briefly refers to the application of the success factors proposed on section 4, through recommendation systems. Section 6 presents an illustration of the main functionalities behind a website about an ongoing implementation of an online shop and, finally, section 7 presents some conclusions and future work.

II. E-Market Description

The competitive market of today requires companies to be in all parts of the world at the same time. The e-commerce presents itself as a tool for an extended range and with a considerable competitive advantage over the local market [5]. Although there is already a great adherence and growth of e-commerce, it is expected that this still has a high degree of progression.

The demand for niche markets and marketing allies could revolutionize the new e-commerce. All technological change is to allow cement the online business, by providing payment

procedures in a safer way, up to highly effective logistic companies. This whole process of creating online stores involves many techniques and multidisciplinary areas, with a synergy of skills required for obtaining the desired result [6]. Thus, attention has to be paid to a variety of subjects related to this issue, including the study of implications of e-commerce at different levels of impact, particularly in terms of human behavior and preferences, as well as analysis of alternatives for its implementation.

Understand what drives an on-line shopper to buy online through a website as an alternative to traditional commerce is one of the goals that distinguish a successful project, from an inconsequential attempt. Being involved areas such as engineering, design, computing, communications, marketing and even psychology, it is easy to realize the interest and motivation for this work.

III. E-commerce

The increasing growth of e-commerce in terms of quantity has not evolved at the same rate in terms of quality. The possibility of creating an online store and start selling immediately, without investment cost as an obstacle, has provided many people with no knowledge in this area to invest in this area. It is easy to prove this observation by searching online stores which, for instance, simply do not allow understanding how one can buy a product when being faced with a confusing website that encourages the user to immediately close the web page, even before watching its contents.

Therefore, there is still much room for improvements, by applying logic of success factors, although there are also online stores quite well designed.

A good example of good applicability of success factors is the Nike online store. Guidelines are drawn from large companies like this one that will allow small businesses to explore these alternative business ideas, knowing that at the outside, resources are limited.

Thus, designing an online store without any prior investigation of potential success factors may turn out to hardly succeed.

IV. E-Commerce Success Factors

The e-commerce is undoubtedly the future that most companies will have to face. However, the fact of creating an online store does not mean guaranteed success.

The e-commerce is an issue that turns around a multidisciplinary environment that must be in harmony as there are complementary aspects arising from each area, which have to be considered and integrated, as a requirement for success [7].

Just like a real physical shop, also in e-commerce it is not just the commercial part that is implied but a whole set of assumptions that must be guaranteed and controlled.

The internet is a medium with its own characteristics, where every detail must be thought out carefully so that the end result is as expected. Figure 1 presents a proposal of the main success factors to be considered when putting forward an on-line shop and corresponding website.

Considering information globalization and social networks, some advantage can be taken from recommendation strategies in order to give some personalized advice.

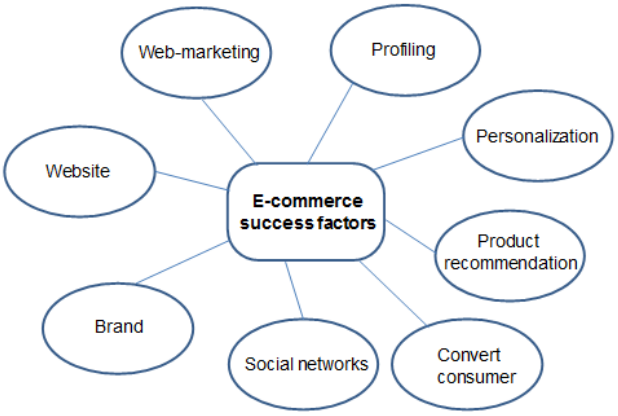

Figure 1. Main success factors for e-commerce

The concept of e-commerce is similar to the solar system, where the e-commerce is the central star and it must include on its orbit all the other stars. Once one of the surrounding stars gets lost from its orbit the whole system's stability can be checkmated. Whether for lack of credibility, poor brand concept or simply due to a poor visibility, any failure on one of the factors implies that the project may not work properly and there are plenty of online stores that just do not sell. In this work we focus on the critical success factors related with recommendation systems and personalization of on-line shopping: website, web-marketing, brand, social networks, convert consumer, product recommendation, profiling and personalization.

A. *Website*

The website is a showcase of the online store, which has to take into account to whom it should attract attention, as its mere existence does not mean its success. The whole construction of the website must be developed by a multidisciplinary team because there are several areas that will be involved for achieving the final product with the intended image and functionality. For example: the programmer may build the website quite clearly, without any bugs or technical problems but if the designer does not provide an efficient commercial aspect to it much probably it will fail [8].

Therefore, all those multidisciplinary areas should be involved on the creation of the website, so that each area can provide an important contribution to the final result of the website, which has to be complete and balanced and thus turning possible to pass an image of a serious and credible company without any tendentious reflection just about a particular area or concern.

B. *Web-marketing*

A well structured marketing plan, with a well defined line and an innovative and credible image are essential success factors

[1],[9],[10]. Thus, it becomes a necessity, to keep innovating and re-inventing ways to present products to the world [11].

Although a segment of the Marketing, the Web-Marketing deserves special mention, for conceiving a fantastic store, in terms of design and image, may seem to be good enough for becoming very successful, but imagine how disastrous it would be if no one would pass on the street where it is located and the same may happen regarding online stores (http://www.acepi.pt).

Searching engines are a major interface between consumers and online stores; therefore a good positioning or ranking of a website is of utmost importance. Searching engines like Google have tools to know how many times certain words are searched and analyze all statistical data about the number of visitors about a given online store.

There are several ways for enabling good rankings of websites within searching engines, which turns out to be even more important when a website includes sponsored links. The best way to attract potential customers is to accurately know the market where it operates, so that the whole effort is focused in favor of the business [10].

Knowing our market can help to know, "where we are" and "where we want to go" [1]. Measuring performance at each step of business allows adjusting measures to consider and values to obtain, through a sustained growth. This measurement is only possible if there are predefined and measurable goals for market trends. Therefore, it turns out necessary to know if it is a market of thousands, millions or billions.

The more information we have available the better our position will be to support good decision making strategies. Understanding the market is the first step, setting goals is the second one and nothing serves the former is the next one is not acting and evaluating results obtained.

C. Brand

Nowadays, the world of brands moves millions, as increasingly more companies look for convincing brands, to better affirm themselves among competitors [10].

In e-commerce the paradigm does not change, to buy online, you need something to push you to finalize your purchase. It is not enough to think that a brand is just a cute name and a futuristic logo, the whole communication with the surroundings has to be thought, and the care and concern about the customers need to be visible in order to enable to construct a loyalty based relation with them [10].

The concept of a brand has to have the objective to be a precise way to reach the clients and establish a collaborative interaction with them by enabling integration of different areas. Impact, desire and trust are the ingredients that may enable a common brand to become a benchmark worldwide. If the main purpose of the brand is not describable by a few words, it is most probable not well designed.

D. Social Networks

Social networks have changed the way people communicate; it was like reinventing something we did naturally, with a slower speed. The initial idea was aimed at friends to join on a virtual network where they could communicate about everyday's life. This phenomenon has exceeded expectations and inevitably began to move towards the business world. If customers are concentrated on a particular community, nothing is more natural than participating on it.

All major brands present themselves within this environment, trying to reach a huge market with a multiplying growing effect [10]. Applying the phenomenon of social networks to e-commerce, has the advantage of these people being already regular users of the Internet, and to capture their attention to new products and services requires a good communication and marketing strategies to be implemented. Thus, one can gain customers through these communication engines, enhancing the target market.

E. Convert Consumer

Once achieved the whole way to generate flow of the market to the online shop, there is still another important but less explored subject, which consists on being able to convert a visitor into a customer [12]-[14].

With the tools available on the market it turns possible to analyze all the details of the visits to a website. From the time each user wastes browsing, up to the number of visitors per day, broken down by country and other indicators, many different kind of analysis are possible.

When the number of visits to a website is big and the sales have not risen, something must be done to reverse potential customer's bad attention. Issues related to websites usability, communication and marketing problems must be completely abolished.

F. Product recommendation

As the World Wide Web evolved into an incredible huge mass of distributed information, recommendation systems emerged as an option to minimize the time consuming task of searching the Web. According Montaner, López e Lluís de la Rosa [15], the key concept in recommendation systems is the user profile. With the user profile in mind, they define recommendation systems according to two essential factors: the profile generation and maintenance, and the profile exploitation.

Although many derived approaches are emerging, recommendation systems are mostly based in three different paradigms: content-based, collaborative and knowledge-based. The content-based paradigm applies to systems that rely on item information to retrieve recommendations. This means that item attributes and ratings are used to see what best fits the user needs. On the other hand, collaborative systems compare similar users to provide recommendations.

The knowledge-based paradigm tends to tackle the content-based and collaborative system weaknesses. Through the use of advanced knowledge representation techniques, such as ontologies and case-based rules, a reasoning process is performed, allowing the user to incrementally specify his needs and interests. Using a recommendation based approach, we can be sure about the right product to the right consumer.

G. Profiling and Personalization

The "experience economy" [16] is a result of the growing demand for individualization. Companies need to fulfill customers' individual needs while maintaining prices as low as possible, which is a permanent challenge for modern companies.

Therefore, it turns out to be of upmost importance to know what each persons' preferences regarding products characteristics and an efficient way for customers' profiles obtaining and processing consists on an important way to enable the nowadays increasingly desperate companies to attract attention to their products.

Moreover, a company may allow a user to completely customize a product from scratch. Alternatively, it may choose to guide him offering a base set of options associated with a particular model or configuration domain in order to enable the users to personalize the products they want to buy.

Users profiling can be accurately performed through recommendation systems and the next section presents some more detailed ideas about this subject.

V. Recommendation Systems

This concept is not new, but most recommendation systems result from the merge of different techniques from different domains, from statistical, computer science to artificial intelligence.

The way recommendation systems interact with the user is also very important. Obtaining feedback from the user is time consuming and users avoid providing filled feedback forms. Transparency might also be important to some users, as they want to know why they are receiving certain recommendations. The right transparency helps the recommendation system getting higher trust levels from its users. The initial amount of data when the recommendation system first runs is also a big issue. Since recommendations are usually based on already existing data (e.g. user profiles and choice history), systems need to tackle this issue so they do not suffer from the cold start problem. Latest implementations begin to use ontologies, thus giving semantic meaning to the information and empowering recommendation systems.

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A. State of the art – recommendations

Recommendations can be given for multiple, vast concepts and different areas of knowledge. In highly content-based recommendation, there are already many implemented systems. Some of the most popular examples go from Amazon to CDNow. Also, some systems have not only the ability to retrieve highly rated items, but to know which ones are disliked or not interesting at all (e.g., WebSell).

While highly content-based systems might not need a profile learning process, tourism recommendation systems must have effective profile learning techniques implemented to be valuable through time. Amazon, for example, uses purchase history and product lists to retrieve recommendations, thus not having the need for a profile learning process.

Many approaches have already been implemented on many different business areas. From news, to movies and music, recommendation systems have grown in popularity as the World Wide Web grows in size. Tapestry [15] dates from 1992 and uses content-based and collaborative filtering to filter mail messages. Although it is not the usual kind of recommendation system it works the same way.

To provide filtering, Tapestry saves the reactions of the users when reading documents thus allowing a user-item rating to be kept. The user is also able to specify filter queries, avoiding unwanted documents to end up inside the mail box.

Although pure recommendations have their own weaknesses, in some types of recommendation systems, it might not be a critical issue.

WebSell [16] is a recommendation system that uses case-based reasoning and decision trees. Along with collaborative filtering, it is designed to support single business selling a range of products or services. WebSell was tested through the implementation of an agent capable of giving recommendations for apartment renting. The agent requests feedback using a web form that is later used to calculate preferences according to similar cases.

The most peculiar feature of the WebSell recommendation system might be its support for customization and configuration. Although there are many recommendation systems that are based on simple fixed products or items (like books, movies or CD's (Compact Disc), WebSell tries to give support for complex item recommendation. This includes holidays, insurance plans and many other recommendations that involve a large quantity of variables.

To achieve customization, WebSell uses two different approaches: operator-based customization and incremental component replacement. Operator-based customization allows the user to apply a set of operations that change the provided recommendation product or service into a customized final item. Incremental component replacement assumes that products and services are structured into components. These components can be replaced for other (more similar to the user preferences) components.

Godoy and Amandi [17] took collaborative recommendation one step ahead by proposing a trust-aware boosted recommendation system called FilmTrust.

FilmTrust is a web-based system that explores trust in a movie related social network. With FilmTrust, the users can not only express their particular opinion about a movie (by rating or writing reviews), but also define a trust degree for other users and their opinions. This follows the principle of basing predictions on reliable peers, instead of solely similar ones.

To achieve improved recommendations, FilmTrust contains a set of personal agents that help users find relevant information. While these agents retrieve the user preference profile and provide the desired content-based and collaborative recommendations, they can communicate to improve results. On the other hand, user profiles use taxonomies to hierarchically organize the topics in which the users are interested in, adding knowledge-based capabilities to the recommendation system.

B. Profiling and personalization

As it was previously referred the key concept in recommendation systems is the user profile.

Some systems implement profile learning techniques that halt the system to run the learning process. However, most techniques use a lazy learning approach through which the system can update the model while making recommendations, thus having no offline period. Information filtering methods often include content-based, collaborative, demographic or knowledge-based filtering. The following table contains the main characteristics of the information filtering methods previously described.

The profile generation and maintenance contains the profile representation techniques, the initial profile generation and profile adaptation and learning techniques. Also, when and how to retrieve feedback, are attributes that can be defined into the profile generation and maintenance.

Figure 1 describes techniques used to tackle every issue contained in the profile generation and maintenance category.

Some systems implement profile learning techniques that halt the system to run the learning process. However, most techniques use a lazy learning approach through which the system can update the model while making recommendations, thus having no offline period.

Inside the profile exploitation, there are information filtering methods, user profile matching and user profile-item matching techniques (figure 2). The following figure contains the main options used by recommendation systems for each of the previously mentioned characteristics under the profile exploitation category.

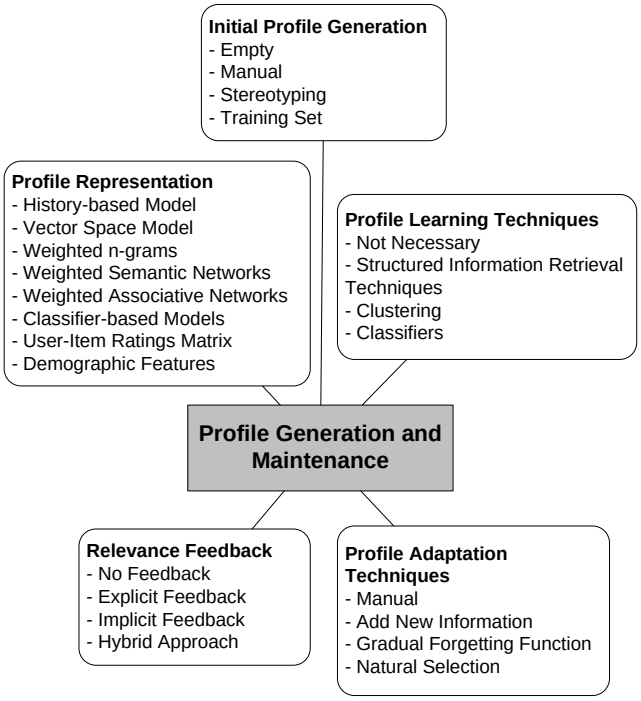

Figure 1. Profile generation and maintenance

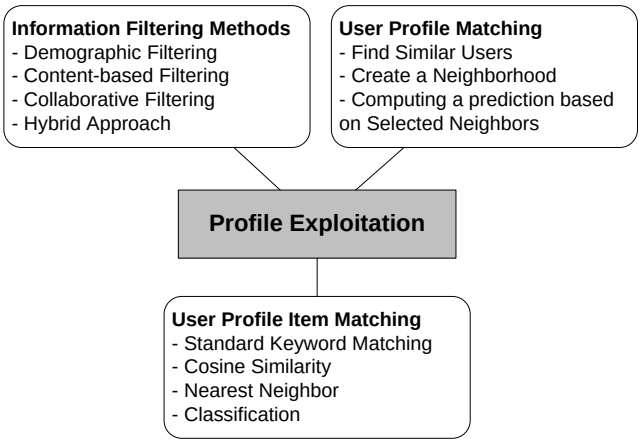

Figure 2. Profile exploitation

Information filtering methods often include content-based, collaborative, demographic or knowledge-based filtering. Table 1 contains the main characteristics of the information filtering methods previously described.

Table 1. Information filtering methods characteristics.

Content Based	**Collaborative Filtering**	**Demographic Filtering**	**Knowledge Based**
Similarity between items characteristics and user preferences.	Similarity between users.	Stereotypes using demographic information.	Rely on an explicit representation of knowledge (e.g. *ontologies*).
Suffers from *cold start* and *over specialization*.	Suffers from the *cold start* and the *gray sheep* problems.	Useful when combined with other filtering methods.	Can benefit from machine learning and semantics.

VI. Web Platform Illustration

Globalization introduces new challenges for companies that have to face a potentially large number of business competitors and new requirements that have to be fulfilled in order to maintain market share and improve customer retention. The implementation of competitive strategies and process optimization procedures is a requirement for survival. Web platforms are being developed over the years [20]-[34], by using several distinct technologies and with the growing of web-based utilities, web-service oriented systems intend to be more and more important and useful and this is why we decided to give our contribution in this domain, expecting that such a kind of platform will help capture customers' needs and preferences continuously, thus contributing to improved, efficient and agile processes.

The integration of front-office and back-office processes needs to be efficient, cost-effective and error-free.

This communication channel can be used to automatically feed distinct point of sale (POS) systems, including websites, interactive product specification systems for physical points of sale and promotional interactive media. Additionally such a web platform may connect these POS systems with management back-ends and production management systems.

To begin to transform theory into practice, let us present our online store proposal, which is under a starting-up construction about "Extreme Luxury Furniture", belonging to "iQNe-commerce" (Niches quality innovation), to be put to work through our proposed website, which is illustrated through Figure 4.

This online store is being designed according to the critical success factors presented in this paper, based on the existence of a multidisciplinary team working on an integrated and cooperative manner, to leave no detail to be thought and accomplished. From graphical design to the functionality of the whole buying process, everything is analyzed and there is nothing that cannot be improved constantly. Only with a spirit of hard working for providing these characteristics it becomes possible to obtain a sustainable success. If there is no expertise around any of the key characteristics of success previously described, everything becomes more complicated and any aspect that had been overlooked may compromise the whole work done.

A. Website and web-marketing

The website is a showcase of the online store, which has to take into account to whom it should attract attention, as its mere existence does not mean its success. The whole construction of the website must be developed by a multidisciplinary team because there are several areas that will be involved for achieving the final product with the intended image and functionality. For example: the programmer may build the website quite clearly, without any bugs or technical problems but if the designer does not provide an efficient commercial aspect to it much probably it will fail [8]. Figures 4 and 5 display initial appealing website and a zoom of one product.

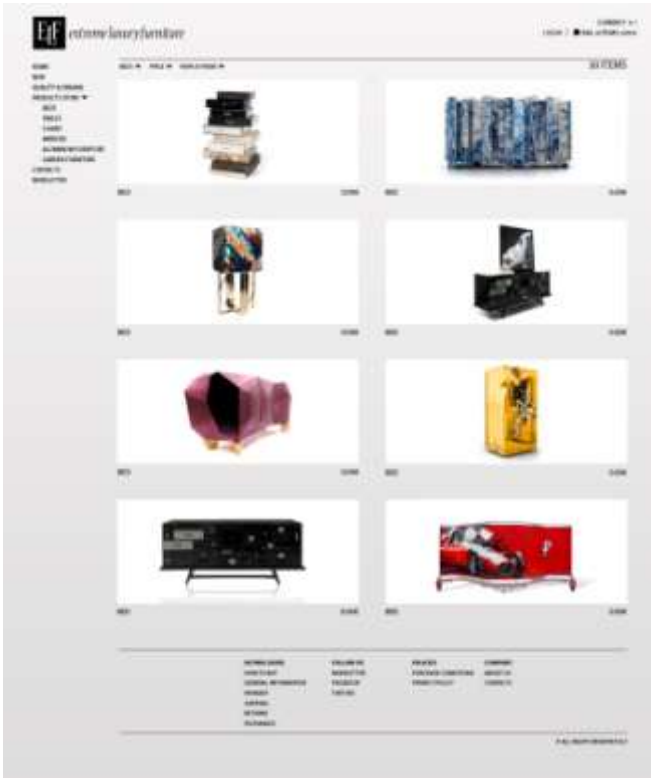

Figure 3. Web site illustration

Figure 4. Product zoom example

B. Brand

Nowadays, the world of brands moves millions, as increasingly more companies look for convincing brands, to better affirm themselves among competitors [10].

In e-commerce the paradigm does not change, to buy online, you need something to push you to finalize your purchase. It is not enough to think that a brand is just a cute name and a futuristic logo, the whole communication with the surroundings has to be thought, and the care and concern

about the customers need to be visible in order to enable to construct a loyalty based relation with them [10].

Figures 6 and 7 illustrate the company's group and the company's promotion brands.

Figure 5. The enterprise group brand

Figure 6. The company's brand

C. Profiling, personalization

Nowadays, companies need to adopt a strategy of differentiation as customers are demanding increasingly and companies need to adapt their products to the specific needs of customers. Modern consumers are particularly exigent, demanding higher levels of quality, functionality and correspondence to their specific needs. Traditionally, the inclusion of optional specifications and product variants had more to do with charging "extras" and gaining financial profits than with offering the customer a richer buying experience.

The implementation of a web platform for facilitating users profiling and personalized products selection will allow the creation of a central channel for the distribution of information about simple and complex products, supporting customers and businesses with their product specification and corresponding businesses production tasks.

Figure 8 illustrates such a personalized product.

Figure 7. Personalized extreme luxury furniture example

D. Product recommendation and recommendation systems

The platform underling this paper gives a special attention to get information about users preferences, according to some main groups of individuals, divided by criteria such as ages and gender, as it is an important way for enabling to more appropriately interact with each kind of user. Therefore, it becomes possible to obtain feedback from them at the same time consuming boring endless forms are required for each individual. Moreover, as transparency also plays a fundamental role, detailed information about each product and buying process is also provided according to each specific user profile.

E. Illustrative example discussion

The website www.luxury furniture.com has as main advantage its web-marketing strategy. The site domain is representative for the market niche. This is important to increase its position on the searching engine for obtaining favorable searching results about the on-line store.

Moreover, the domain of this site enables to explain its content and contains important information about relevant keywords for supporting web searches. Besides that, the marketing strategy is not good; because once we analyze the website we realize that not all of its products are luxurious. This situation decreases the customer focus, credibility and also violates the niche market strategy.

The on-line store available through the website www.bernadettelivingston.com also expresses a good web-marketing strategy, because the keywords in back office are appropriate for this kind of niche market but the marketing is poor. On the other hand, the design and usability are really bad examples. The information is disorganized and excessive, which conducts to a bad and difficult user's experience, when trying out to buy something. Moreover, the website design is also very out of date. The colors are much confusing and there is no identity expression through an appropriate brand design.

This website www.williams-sonoma.com reinforces the idea of the previous analysis present on the other sites referred above, regarding a good web-marketing but inside the website everything is confusing. The layouts have too much text and it contains a big mix of products, which does not turn out to be a good strategy for attracting the attention of the niche market. Therefore, this store shows an intention to sell quite different kind of products, which are not related and also not luxury ones.

It is possible to face with good website on www.juliettesinteriors.co.uk and on www.taylorllorentefurniture.com, but they have a feature that fails. "Juliettesinteriors" fails on its marketing strategy because it mixtures luxury products with other non luxurious ones, and people who shop at luxury furniture does not look at common products.

On "taylorllorentefurniture", the web design is very good and the general image is also positive. Therefore, regarding only appearance it seems ideal. The packaging is good, the set of products seems to be appropriate but what if there are no customers? By selecting the keywords related to the target market, this page appears in third results page by using the Google's ranking! This is the big problem of many websites,

as all details were thought carefully but they forgot their focus, to get customers.

After this analysis, the opportunity for improvement for this websites appears to be evident. More quality will be possible to achieve by carefully looking at accomplishing the whole set of success factors put forward on this work. The proposed "extremeluxuryfurniture" online shop does not aim at being the largest luxurious furniture company of the world, as it does also not aim at being the website which gets the highest number of visits, regarding it does not intend to include and sell any kind of product to get the maximum momentary profits. Therefore, the main aim of this proposed on-line shop consists on aspiring a world's extended luxury furniture shop, by selling only luxury products to appropriate customers. So, the proposed strategy consists on trying to focus and attract just potential customers instead of the whole population, being the quality of website traffic one of the biggest issues to face for being able to get advantage regarding the marketing strategy of the company. The picture above shows the starting up point of "extremeluxuryfurniture" development website, which expresses a "minimalist" and quite simple design and structure, which are its brand image. This simplicity will also be present on all processes underlying the website, for instance, regarding payment processes, as well as for customer registration, along with the whole website usability and communication facilities for customers and partners.

VII. Conclusion

With the knowledge of the necessary ingredients for success in e-commerce, it is possible to build a highly profitable business on a consistent basis. An online shop creation based on a fully integrated discipline, among the many involved actors in the appropriate context of each kind of market enables to create a confident attitude on potential on-line clients.

Therefore, it is of upmost importance not to distract them while compromising the balance of a whole website. There is still plenty of room for improvement in the market of online shops, as more and more people choose this kind of shopping, which enables entrepreneurs to get closer to its market, while presenting an appropriate solution for their clients' expectations. Moreover, while online shops may attract segments that can easily be taken on the basis of little investments, sometimes it is not given the necessary attention to aspects for enabling a good e-commerce practice. Often those aspects are due to lack of analysis and investigation regarding a set of proposed success factors described through this work, which many people trying out this kind of products selling do sub-estimate and among those factors some that reveal itself as of upmost importance are related to product recommendation and recommendation systems.

Moreover, other factors are related to the website itself, its design and usability, the brand and the web-marketing strategies, as well as social networks and concerns about the whole supply chain integration, along with other concerns, regarding users profiling and consumers' conversion.

Additionally, enabling products personalization is also very important to attract consumers, as they are each day more exigent and want to own special and if possible unique products.

In this context the use of recommendation strategies including adaptation and personalization is very important. The implementation of techniques capable to learn and improve, that acquire information from user interaction and feedback might as well be one of the best approaches. Transparency is also an issue when providing recommendation, since for many users, knowing how the recommendation is given is an important factor to trigger trust.

Therefore, a more professional attitude is needed, as all these considerations are of biggest importance for enabling to make the difference between a modest online store and an online empire.

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