MSc in Technology, Innovation & Entrepreneurship

Report in the module of:

INTERNETWORKED BUSINESS ENTERPRISES (TIE-4310)

with subject:

New Telecommunication Service or Product

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ABSTRACT

In this assignment it is requested to introduce a new telecommunication product or service. The one proposed, is neither a product nor a service. Due to its characteristics is a utility, since the concept and the framework upon it operates, aims to bring together three major areas in order to serve an environmental mission.

The wideness of this approach was one of the factors that triggered the inspiration to start thinking in a different manner, trying to innovate and adopting “outside the box” philosophies.

Therefore, by taking the responsibility of accomplishing this coursework, there is a great challenge which motivates to a research for introducing an innovative idea, and find out whether this is feasible. It is true that when studying for real cases, where new and customized solutions are necessary to be followed, there is no a “wrong-right” relationship. However, there are a number of similar cases already applied, there is relevant experience and there is useful material that can be adopted and incorporated in the new customized philosophy.

It is expected this coursework to represent a first study which will guide to a further and deeper analysis.

SUMMARY

Purpose – The aim of the coursework is to introduce a new telecommunication product or service and demonstrate a preliminary report on whether this new idea is feasible. Based in three major areas of current era and being inspired from the subjects covered in references and bibliography, it is concluded that, this challenge is giving the opportunity to expand the limits of the initial idea. There is an effort in bringing together the environment, the technology and the economy. This meta-merging, although seemingly incompatible, will work for the sake of all parts involved.

Design/Methodology/Approach – This coursework is a technical report, based in scientific resources, personal know-how, as well as experts' views.

Findings – Based in this primary study there is a possibility to apply the proposed utility, since there will be people who will show interest in investing and supporting this idea.

Research limitations/implications – The research is based in a number of academic resources strictly related to the three investigated areas, environment-technology-economy. Moreover, information used to support the idea was originated by true experts from relevant disciplines. The material processed is derivatives and conclusions of research made by different groups of authors/scientists in relevant issues. It is true that so far, there was no found a similar idea.

Practical Implications – This coursework is aiming to present an innovative idea in telecommunication area, introduced as product or service. To accomplish this, we are based on a traditional model to investigate the feasibility and the real demand for such a product. We consider that time lines to complete the whole project are fairly restricted. Though, we have planned to continue the research and work upon this, in later times and extent it in the dissertation level.

Originality/Value – This coursework was prepared as the sixth paper to submit for the MSc in Technology, Innovation and Entrepreneurship course (University of Sheffield – CITY Liberal Studies). The relevant module for which it is submitted is the ***"Internetworked Business Enterprises"***, with module director ***Mr Thanos Hatziapostolou***.

Keywords – ICT, Near Field Communications, Recycling, Stock Market, RFID

Paper type – Interim Report (15%) – Final Report (85%)

TABLE OF ACRONYMS

ICT	Information & Communication Technologies
NFC	Near Field Communications
RFID	Radio Frequency Identification
CSR	Corporate Social Responsibility

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1. INTRODUCTION

Continuous progress in information and communication technologies, have cultivated an innovation-friendly environment. Such advancements created a positive framework for more tools, more combinations, more potential either for incremental or radical innovations. New technologies affect people and resources in a catalytic way through their direct involvement.

1.1 Technology

New trends in business telecommunications have caused the appreciation of their business value and have defined a new digital business environment. Main factor is the importance of mobility related to the philosophy of wireless and mobile computing.

1.2 Environment

Environment will be the leader of the next decade. ***Reduce; reuse and recycle***, are the new watchwords for manufacturing managers, looking to set new standards for manufacturing excellence. And just like any other improvement idea, there are benefits of being the first, and the best at implementing it. *[1]* So far, few things have been made for the protection and maintenance of the environment. At least, in some countries (including European Union), a number of environmental programs are under development or about to be applied. The change of priorities and the set up of environment in the first place, will be the challenge of the years to come.

Furthermore, it was proved that human existence overloads the environment. Different aspects of human's actions aggravate, while in parallel accelerate, the rapid decrease of raw materials.

1.3 Economy

Although technology and environment follow opposite paths, concerning their progress, they are both parts of the economy. Technological achievements and environmental resources are considered as capital, and constitute the basis of new economies. For example, in USA a whole economy is established in the companies of new technologies (NASDAQ), and this has affected linked economies in the rest of the developed world.

Stock markets involve people and capitals. Despite their unsteady route, they act as a development lever for any economy. Country economies are depended on them; globalization and technology facilitate their invasion, to daily economic life and because of this, a number of financial tools have been developed to increase money generation.

In contrast to the elder years, where the philosophy of auctioning was restricted, last decade, there is an increased mobility in people and capital, based in the stock markets. This move affects people's psychological biases, shaping specific types of behaviors and direct investors in the effects of overconfidence, socialization and familiarity. *[2]*

1.4 Idea motivation

The wide approach in seemingly incompatible areas is more challenging and hides innovative paths that wait to be discovered. The initial motive of the idea was ***to contribute in saving the planet and minimize the catastrophes caused by human consuming.*** On the other side, as the reserves of raw materials are decreasing, there could be a way nothing goes wasted. For every product there is a return path (reverse logistics).

Mass production and use of raw materials is not an endless channel. Soon, companies will be obliged, by the circumstances, to use only recyclable raw materials. This will happen for two reasons: (a) the materials will simply no exist or (b) their prices will be extremely high. However, it is positive that recycling is growing as a vital component of many business strategies. *[3]*

On the other side, a number of mobile operators have announced new services offered to their customers relating to digital payments through their phones, replacement of credit cards, tickets, even e-commerce solutions. *[4] [5]* Alternative wireless technologies have been deeply spread in individuals and companies creating "cutting edge" mechanisms for people interaction. *[6]*

In addition, the new era has been characterized by the mobility of capitals through stock markets and "carry trade". Globalization has created the suitable environment for the cultivation of stock market mentality among individuals.

Therefore, bringing together **Environment – Technology – Economy,** could result in a positive outcome. Since late technological achievements have proven to be a serious component of the economic environment, this relationship could be an initiative to be exploited for the sake of environment.

1.5 The idea

Recycling, more or less incorporates the re-process of waste materials in a production process. It represents the returning of products, previously considered as waste, to a production channel. Moreover, recycling enables the original raw material of a product to be processed and reused several times. *[7] (Appendix D)*

Although recycling is a popular practice, well-known for its beneficial results, the percentages of using this practice worldwide are very low, compared with the number of inhabitants per area and the potential material quantities. *[8]*

Thereby, the idea is ***to make people recycling by getting in return some kind of reward, using information and communication technologies.***

In order to make people recycling, there should give them a strong motive. This motive originates from *the sense of reward*, which is related to the meaning of adding value to a practice, and remunerating an achievement. If there is a value in the process, people are expected to participate in recycling. There is a belief that, people are primarily utility maximizers, motivated by costs and benefits. *[9]*

Therefore, two key parameters will comprise the base for the idea to be developed.

(i) *the possibility to earn something;* and
(ii) *the feeling of participating in a game.*

Besides that, the aim is not to offer a new product or service but instead a ***real utility*** to people and planet. In other words, the idea is the creation of a company which will run a "***Recycling Stock Market using Information and Communication Technologies with emphasis in Near Field Communications"*** *(Appendix A).*

2. PROBLEM ANALYSIS

The problem of low-recycling has global characteristics. Although there are regions with fairly high rates of recycling (almost 50% in some recyclables), this is not an adequate percentage comparing to the given potentials. Mostly this problem has been identified due to the low correlation between attitude and behavior of individuals. *[10]*

People buy products to consume. Packaging is the medium which incorporates the product. Although it may serve marketing and operational reasons it is the carrier which in many cases could be indefinitely recycled (e.g. aluminum cans).

In addition, within the supply chain of a product, it is identified that during its pathway to the final destination, the product changes owners reaching the end consumer, who is the final owner. Therefore, the aim is to enable end-consumers passing this ownership to the first link of the supply chain and in return have a kind of reward. To demonstrate this, it is expected to: *[11]*

- make it easy to customers to be “green”;
- find ways to empower customer;
- enlist the support of customers; and
- establish credibility.

The problem starts from the individual-consumer and ends to the environment and the economy. Recycling saves precious natural resources, energy, time and money.

There is a distance among attitude and behavior on most individuals. Although advertising and campaigns affect people’s beliefs, who accept the need for saving the environment they follow a different practice.

3. PRODUCT-SERVICE DESCRIPTION

The proposed service is based (a) in the proximity technologies and wireless networking, (b) in the practice of recycling and (c) in the philosophy of auctioning.

Since the quantities of raw materials are continuously decreased and recycling still, is not one of the most popular methods, there is a link with technology. It is introduced the application of "proximity technologies", as part of the individual's daily life, trying to convert them in a tool for recycling and giving the incentive to people of getting a reward through auctioning.

Adopting the philosophy of stock markets, where each company publishes its shares in the market and anyone is able to purchase a number of items, at a specific fluctuant price, it is expected this practice to add value in the idea and affect the proposed methodology in an effective way.

Garbage may generate money, thinking differently and acting "outside the box".

For instance, a creation of a web site, similar to the Athens Stock Exchange web site (www.ase.gr), is proposed, where interested companies, intermediaries or other involved parts may participate in this auctioning system in order to get the needed recyclables. Transportation of the auctioned goods from the warehouse to the winning company will be a matter of negotiation depended on a number of parameters, such as the quantities, its infrastructure, distance etc.

3.1 Participating entities

In this section are described the participating entities of the service. Their reference is considered necessary, especially for the understanding of the methodology as described in the next section.

In this service there are four entities that are parts of the system: *(Appendix B)*

- Individuals as consumers (formed in groups of people, or communities).
- Companies that are in the middle of the supply chain regarding the recyclable products (these are the new end-users in this system).
- Environmental associations and movements that have significant experience and know-how (they will keep information about the progress of the service).
- The company that will manage this service and guarantees the success and sustainability of the system.

3.2 The methodology

The idea is concentrated in the 4 most popular recyclable products, ***glass-paper-plastic-aluminum,*** in their usual commercial standing (e.g. Coca Cola cans, milk plastic or glass bottles, water plastic bottles, magazines and newspapers and similar objects).

There will be a managing company which will administer the whole system as described in this section. There will be a Call Center located in the company's headquarters, which will constitute the link among customers and the company.

3.2.1 Customer's registration

Anyone who would like to join the recycling game, should send an SMS to the Call Center writing "join" and his/her nickname or real name. This is the first step for the registration.

The data will be registered in the customers' database where the records for all game participants will be maintained. This database will be administered by the managing company, through a team of administrators responsible for its maintenance and secure operation.

After the evaluation of the application for registering, the company will send to consumer's mobile a dedicated software which could establish NFC characteristics in it. This small software has to be installed, as this will transform the phone to a machine that could be identified, by the system's parts and checkpoints. This makes the phone a useful tool that will cooperate with the special collection cabins/dustbins, the super market NFC machines, and any other machine that could join this game network in the future.

Moreover, this software will include a unique key which will nest in the phone and with the phone number and the name will consist the customer's identification string.

3.2.2 The participation

Customers will consume the goods and keep the recyclables. Having registered to the "game", they will visit the special recycling cabins, which could be placed in popular and cross-passing places.

"Smart cabins" should perfectly match with the environment and their design will be friendly and defined in relevance to their mission.

These cabins will incorporate smart technology and have pre-installed RFIDs. The RFIDs will send signals of identification to all registered consumers who happen to walk around the area. The transmission should be based in wireless points which will exist in the area.

Moreover, since the cabins will have active NFC, they may send information using a local mobile telephony network to a pre-defined group of customers who live in the area, informing about offers and instructions to get more points.

The customer, who wants to visit the "smart cabins", will simply touch his mobile to the entry point of the cabin. In this entry point, there will be a NFC receiver which will accept and send the data of the mobile phone (customer's identification string) to the Call Center.
Call Center will revert back with identification and approval or disapproval. If the customer gets the approval the door will open and he may step in.

The "smart cabin" will have 4 compartments separated according to the material. Customer will put in the corresponded compartment the recyclables (one at a time).
Each piece will be scanned and measured, and the total number will be returned through the local NFC receiver to the Call Center. Each recyclable piece will have possible a different value in points, depending on its auctioned price. For example, 1 bottle of glass: 5 points, 1 can of aluminum: 3 points etc.

By the end of the process, the Call Center will confirm the visit of the customer by sending to his mobile, an identification visit code and the number of points gathered by the specific action. The points will correlate with stock shares of each product. For example to get 1 share of glass category, you have to acquire 20 points of glass recyclables.

As we realize, there will be an account for each customer in the central database. In result the customer through his mobile "touch" with an NFC receiver may get any time its total account as well as any other statistics provided by this service.

3.2.3 The collection of recyclables

"Smart cabins" will have a specific capacity to accept recyclables. This means that when a pre-defined level of load reached, there will be sent a relevant message to the Call Center, in order to send a "special truck" to collect the pieces.

In any case the Call Center through RFIDs installed within the compartments could check the capacity's overload any time.

"Special trucks" will be dedicated-to-one-product carriage. Thus, there will be different trucks for plastic-paper-glass-aluminum.

3.2.4 The storage of recyclables

All trucks will bring the recyclables to the company's warehouse. The warehouse will be fully complied with the environmental standards and its mission will be to accommodate for a short period of time all collected quantities.

Recyclables will be sorted in different compartments as well, within the warehouse.

The company through its computerized system will administer the recyclables, knowing exactly the quantities it owns and the value granted to the customers.

3.2.5 The auctioning

Since customer is placing the recyclable piece in the "smart cabin" at the same time is passing the ownership of the piece to the company and will get in return some points-shares.

There is a number of recyclables that may be used at their original condition with no alteration while others, have to be processed prior to their re-use. This characteristic may affect the final price of the recyclable and in result will increase its final value in the point system.

Actually each product (e.g. glass) will get a final price in the end of each auction.
Recyclables' description is uploaded in the auction's web site, with their characteristics and available quantities. There will be a specific period of time where bets will be accepted from different evaluated participants. These participants will be either companies or intermediaries. The same rules as in the stock market will be applied.

By closing session, the prices will be evaluated and define the value of each share and the value of each point accordingly, in the current period. One point usually will equal to one share, but this may change any time, according to the regulations of offer and demand. As "current period" is appointed the time line between two auctions of the recyclables.

By the end of each auction, customers will receive in their mobile phones, if they wish so, the current value of their shares (by simple SMS). Imagine that each recyclable product behaves like a company which has introduced a number of shares in a "Recycling Stock Market". For example, plastic will have its own closing price depending in the final purchased price that took place during the auction.

The number of shares is depended in the combination of the quantities of the specific material located in our warehouse and the demand by the companies for this specific recyclable. As a result, one product may have higher spread than another. This could be manipulated in order to force customers to recycle each time, the product that is more necessary, at the specific period of time. More demand and less offer affects the final price of the share just like in the stock market.

For instance, recycling glass in a period that there is a high demand from intermediaries means better price for the customer. Traditional rules of market will be applied normally.

Therefore, each customer in the end of the day will hold a number of shares equal to a value, probably different each day. This price may be higher, the same or lower.

The administration of the "Stock Market" will be done by the company. Its main target is to achieve as high as possible price for the customers and take advantage of any extra benefits.

3.2.6 "After sales" opportunities

The company will have the responsibility to make direct negotiations with the other participating entities, regarding the positive influence to the customers. Specifically the purpose should be to cultivate a "selective behavior" to them upon consumption issues. Concurrently an environmental attitude could be developed as well as actions on similar subjects.

Moreover, another advantage for the company should be the huge customers' database, which could be used accordingly. On this occasion, the number of points collected by each individual and the recyclables that had been recycled, in combination with other information – such as behavior characteristics, trends - that may be extracted from the database, could create "a profile".

In brief, company could "sell" this profile to other participating entities (e.g. super markets, food industries, environmental organizations, consumers' associations etc.). Furthermore, these entities could make offers through the company to the customers. For example, "Vivartia" could suggest to the customers that if they prefer its products, they will get a specific money discount according to their available points-shares. Therefore, by touching their mobiles through NFC technology in the super market's cashier desk, a transaction will take place.

3.2.7 Additional benefits

As described in the previous section, customers recycle and may get back a percentage or even a full discount, exchanging their shares with new products. Besides that, this action takes place through a network which uses technology and aims to solve environmental problems while in parallel follows rules of economy.

Last decade there is a continuous referral to Corporate Social Responsibility, addressing the movement of companies where they return a percentage of their profits to the society through different programs. The company in this case, may find an alternate income channel, through the effort of approaching big companies that would be interested to support in such a way. In case that extra income will be gained, this will be divided to the customers' shares. This will be advertisement for the company and benefit for the customers.

4. TARGET GROUP

This service could be applied in any organized community, village, municipal area, city or country. In a different sense, it is proposed to be applied in a region. Region, at this point, may be a geographical area, which is defined beyond national borders, but according to other characteristics, strictly related to the service.

Such characteristics could be:

- the inhabitants' current consuming trends and lifestyle,
- the existed recycling percentage (if any),
- the region's proximity to distribution channels and industry,
- the wealthy level of the region, and
- the educational level of the inhabitants.

Since the proposed utility has no attributes of a typical product or service, it is expected to create positive behaviors to potential users. The target group will be comprised of people from different ages, cultural and educational backgrounds. This open utility places no restrictions to people and anyone could join it. Nevertheless inhabitants from under-developed countries could not contribute in extent for known reasons.

In other words, regions which are characterized of high consuming and low recycling percentages may be of top priority.

5. TECHNOLOGY

The European ICT sector has enjoyed outstanding success using the second generation (2G) of mobile communications. Whilst the European industry has developed 3G systems largely, as a generational successor to 2G, a plethora of competing (and complementing) wireless technologies and solutions have entered the scene. These technologies are denoted as alternative wireless technologies (AWTs). Such AWTs create new growth opportunities and also constitute a disruptive threat to existing networks. *[12]*

This idea is accommodated in the trends and drivers of the alternative wireless technologies.

Mobility is the capture and delivery of information, at the point of activity. It is the collection of information wherever required, the accessing to the content when or where it is needed and happens where the work takes place. *[13]*

Proximity is the closeness of one item to another. *[14]*
Proximity network is a network where the physical proximity of a user to a network, makes immediately available a local service environment. *[15]*

The above two components are the essential base for the described utility.
Furthermore, this utility will use the following technologies:

1. WiMAX (Wireless MAN)

WiMAX is a broadband wireless standard that enjoys widespread support from both the computer and telecom industries worldwide, making this technology particularly cost-effective. *[16]*

Briefly below are given the reasons of selecting this technological platform, as the main one to be used, for the flow of information and communication. *[17] [18]*

It has flexible architecture as it supports several system architectures and provides ubiquitous coverage.

It supports high encrypted protocols giving strong protection and security across the broadband wireless interface. Thus, high security may consider as an asset.
It has quick deployment since it requires little or no external plant construction. Technically the necessary equipment can be installed easily and within hours and not days.
It can dynamically administer and optimize the mix of traffic that it would be carried. As it supports a number of different services simultaneously, this could make the flow of information quick and effective.
It gives interoperability as it is based on international standards, portability, mobility because it uses the IEEE 802.16e protocol which offers high capacity and provides significant bandwidth to end-users. The wider coverage is considered one of its most important characteristics. Although it is costly, as it is based on an open international standard, the mass adoption of this standard and the use of low cost, mass-produced chipsets will drive costs down and its pricing would be more competitive. *[19]*

To summarize, (a) the coverage of very large geographic regions, (b) the possible lower cost for commercial wireless services, (c) the point of access for VPN, telecommuting and data access, (d) the increased speed and stability and the (e) redundancy, are the reasons which should direct in its selection for use.

2. Near Field Communication (NFC)

Near Field Communication is a short-range wireless connectivity technology (also known as ISO18092) that provides intuitive, simple, and safe communication between electronic devices. [the keys to…] Communication occurs when two NFC-compatible devices are brought within four centimeters of one another. NFC operates at 13.56 MHz and transfers data at up to 424 Kbits/second. Because the transmission range is so short, NFC-enabled transactions are inherently secure. *[20]*

NFC is the descendant of Radio Frequency Identification (RFID) and it belongs to what so called proximity technology.

The key NFC applications are the following: *[21]*

- The Service initiation, where a user touches an NFC enabled device such as a mobile phone against a specially located NFC tag (e.g. the “smart cabin”) and receive a small amount of information.
- The peer-to-peer application, where NFC is used to enable communication between two devices. For example, in case a user had made some photos with his mobile and would like to print them, he could simply touch his mobile to an NFC-enabled printer and do the job.
- The payment and ticketing application, where mobile phones could be used as a mean to control and pay through credit cards or bank accounts. This is close to the electronic wallet scenario for enabling people to keep records of every transaction made through the day.

In other words, the NFC applications just described will be used in the development of the utility. So far, similar applications have been already adapted by a number of companies, in order to facilitate their transactions with the customers. *[22]*

Furthermore this technology will enable the customers to use their mobile phones as e-tickets, credit cards or even cash. *[23]* Contactless technology can deliver the elusive “mobile payments”. It means, the company, customers, other entities involved could communicate anywhere and at any time.

Some benefits that could be gained from its adoption are: *[24]*

- the better inventory management and recyclables tracking
- the better materials acquisition and their planning
- the improvements in sales tracking and trending
- the compliance with any kind of demands from customers
- the more targeted distribution and approach to the customers
- the better business intelligence

6. COMPETITION & MARKET ANALYSIS

A brief investigation in related literature showed that there is no direct competition in the proposed utility. In addition, no relevant background exists so far, although there are a number of innovative products found, in different areas.

The real difference in this utility, *which makes it unique*, is the combination of these three components: environment-technology-economy. Besides that, their merge and the way that would be combined would make this utility innovative and flexible. Moreover, the nature of people's involvement in the process is another strong attribute.

Since ideas cannot be patented, the utility is expected to be copied by the competition.

Moreover, there is a possibility to face blocking by companies that are related with the recycling process. Recycling has many implications on a system level as new flows are generated, which in turn adds to the existing structures. This means opportunities but also change in the traditional models. Changes may bring conflicts and interference from old players in the market.

The strong advantage of the establishing team should be: (a) the continuous innovative actions, (b) the dedication to the philosophy of the initial idea and (c) the investment to the human capital who will work for the utility. If the company succeeds in making this mix sustainable, it is expected to be ahead of the competition.

7. FINANCIAL PLANNING & FINANCING

First of all, to develop the utility there will be needed three major components:

- People
- Technology
- Space

It is expected that the acquirement of these resources, will use the greater part of the expenses. To begin, it is considered crucial to present the idea in a team of business angels and hedge fund companies in order to obtain the appropriate financing.

This method will be used for the start and the first 2-years of operation. Besides this, a number of actions will run in parallel to the financing. These actions will constitute the revenue model which will be considered the main income channel.

(1) Get advantage of any current infrastructure that could be exploited, either through the use of public ready-made networks, such as the municipalities' human resource or through the cooperation with companies already involved in the recycling business (e.g. trucks, bins etc). This action aims to create a first autonomic infrastructure within already operating services. It is not necessary to owe all resources, from the beginning, but instead may outsource or cooperate with a number of mediums.

(2) Main focus should be given in the search for public funds, European Union funds as well as any other programs related to the idea of environment.

(3) The involvement of more companies in the recycling game will increase the business relations with them.

(4) A significant income should come from the auctioning of the recyclable products in the recycling stock market. There will be a transaction fee depending on the amount and quantity of the auctioned goods each time.

(5) It is aimed for the company, to participate in the Corporate Social Responsibility programs of big companies and receive extra funds.

(6) Another income channel should be the advertisements that would be spread among customers through their mobile phones.

8. CONCLUSIONS

Recycling and ***stock markets*** have a common attribute. They are both based in psychological biases. They are both derivatives of human attitude and behavior. On the one side stock markets and investments incorporate fear and greed. *[25]* On the other side recycling foments attitude and behavior *(Appendix E).* Technology serves as a convenient liaison to bring them together and foster their dynamic to a positive outcome.

Recycling will be the alternative for the companies, within the next decade, in their desire to save raw materials *(Appendix C).* Besides that, waste recycling has a lot of positive effects on the economy as a whole. The growth rate of total output will be higher in countries that recycle more waste. Similarly the production of secondary materials, allow to reduce the quantity of renewable natural resources harvested, driving the economic system towards more sustainable paths. *[26]*

There is ***value*** behind the recycling process. There is a ***development of value*** which does not end to the customer/user, but moves forward throughout the circle which connects all entities involved.

- Customers will receive a reward;
- companies will add customers in their lists through their direct interaction with them;
- public services will show results in their mission to protect the environment, and
- a special network of “NFC players” will be created.

The target of this utility is not to create a “money seeking” mentality. On the contrary, it is expected, through this utility, to give solutions both wise to ***people*** and ***environment***.

It has been identified that price effects are altered in an economy with a recycling sector present. *[27]* Usually recycling projects are maintained and developed through the support of subsides. However, the suggested utility may activate the recycling sector and turn it into a profitable part of the ***economy***.

The adoption of NFC ***technology*** is a mean to this effort. Its use will give advantage to the rising opportunities trying to ease and improve interactions.

In *Appendix F*, there is a SWOT Analysis on the idea, which is an effort to identify, at this preliminary stage, some obvious characteristics of internal (strengths & weaknesses) and external analysis (opportunities & threats).

Ultimately, this idea supports a framework where the company will act proactively, and deliver benefits to individuals, companies, the environment and itself as an entrepreneurial effort. The uniqueness of the idea is based in the combination of economy, environment and technology through an innovative philosophy.

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APPENDIX A

In this figure (*Figure 1)*, it is illustrated the title's structure and the connection between the title of the idea and the related areas.

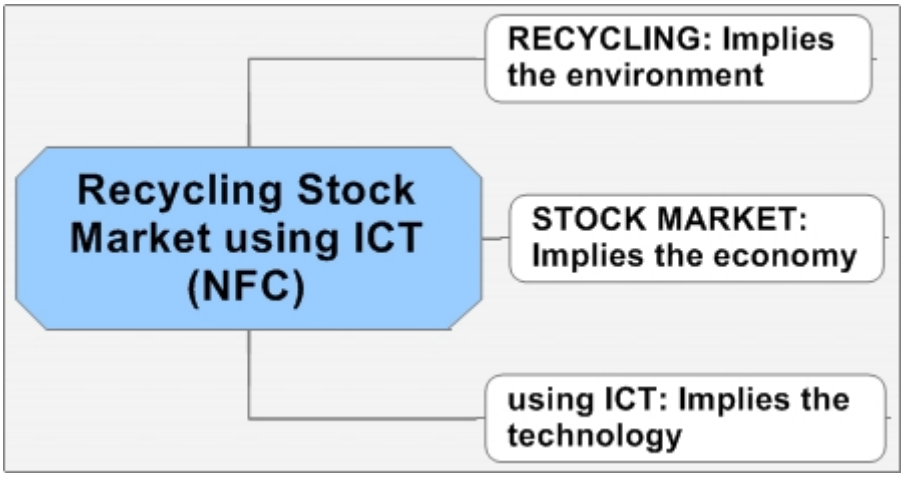

Figure 1.The title of the idea

APPENDIX B

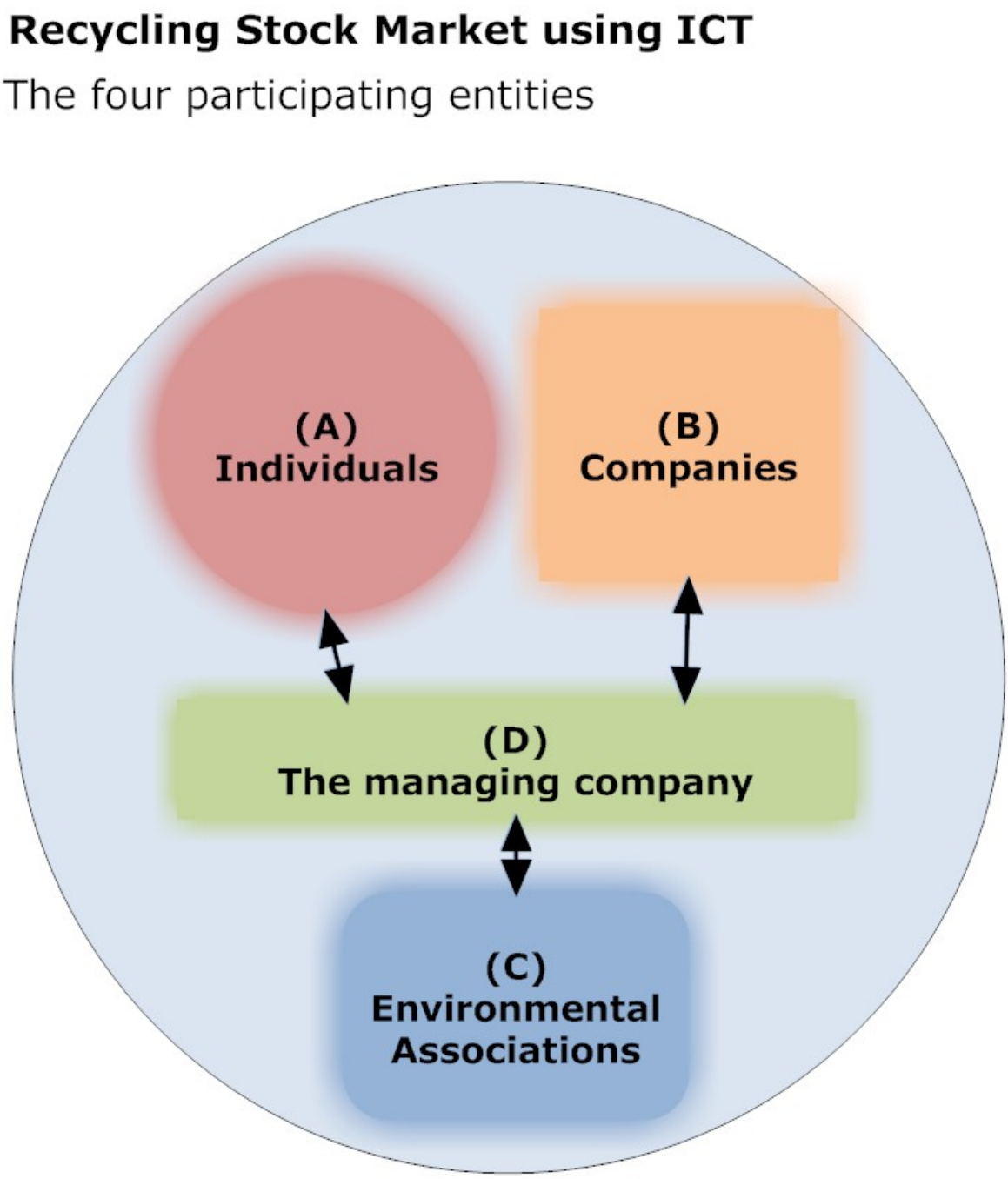

Figure 2. Graphic illustration of the four participating entities

APPENDIX C

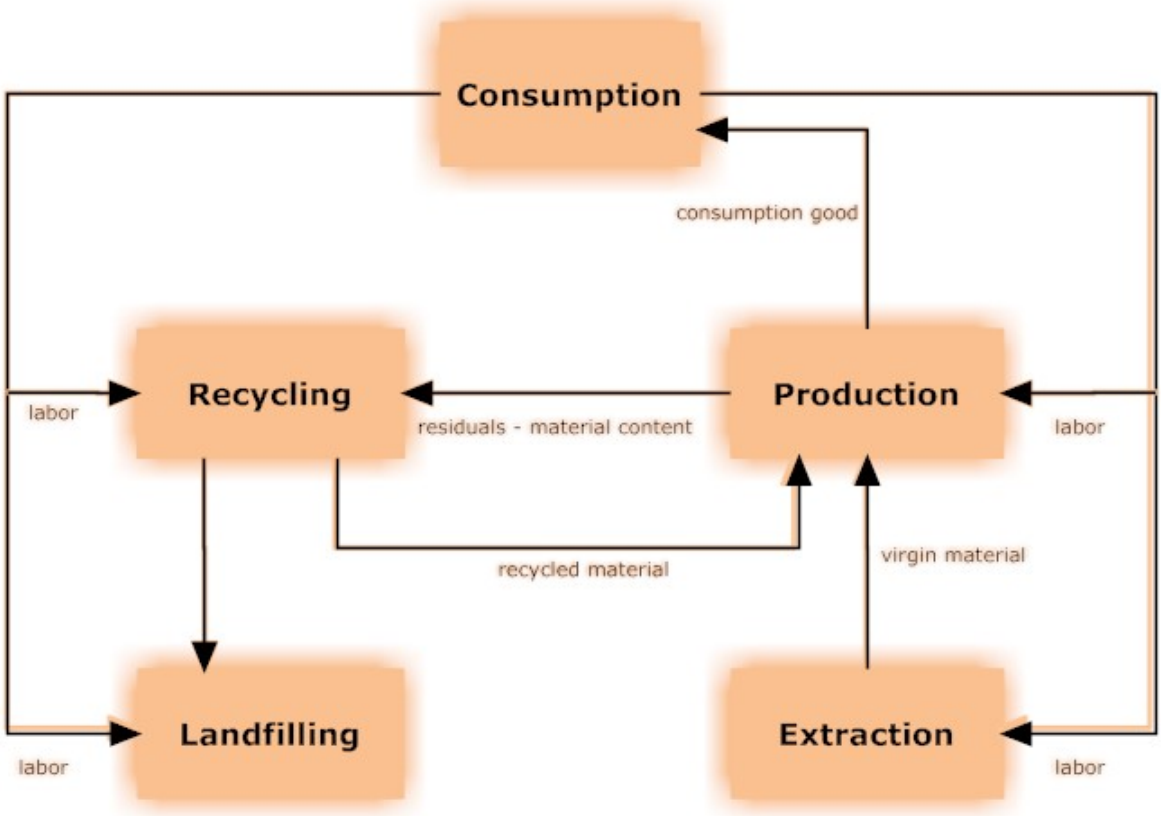

Figure 3. The product life-cycle, flows of goods and materials and prices [28]

APPENDIX D

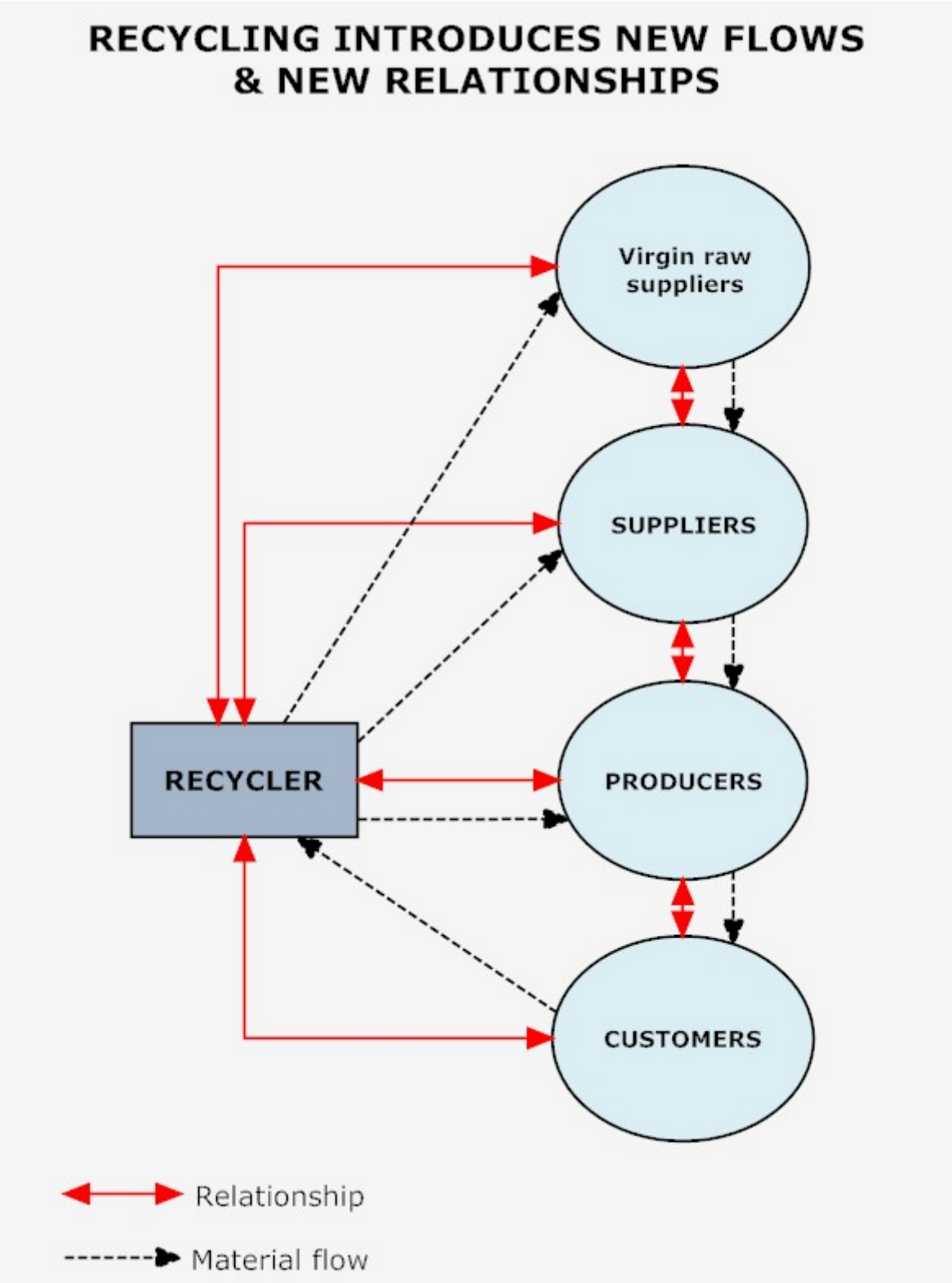

Figure 4. Recycling introduces new material flows and new relationships, thus reshaping the role and the position of the end-customer. [29]

APPENDIX E

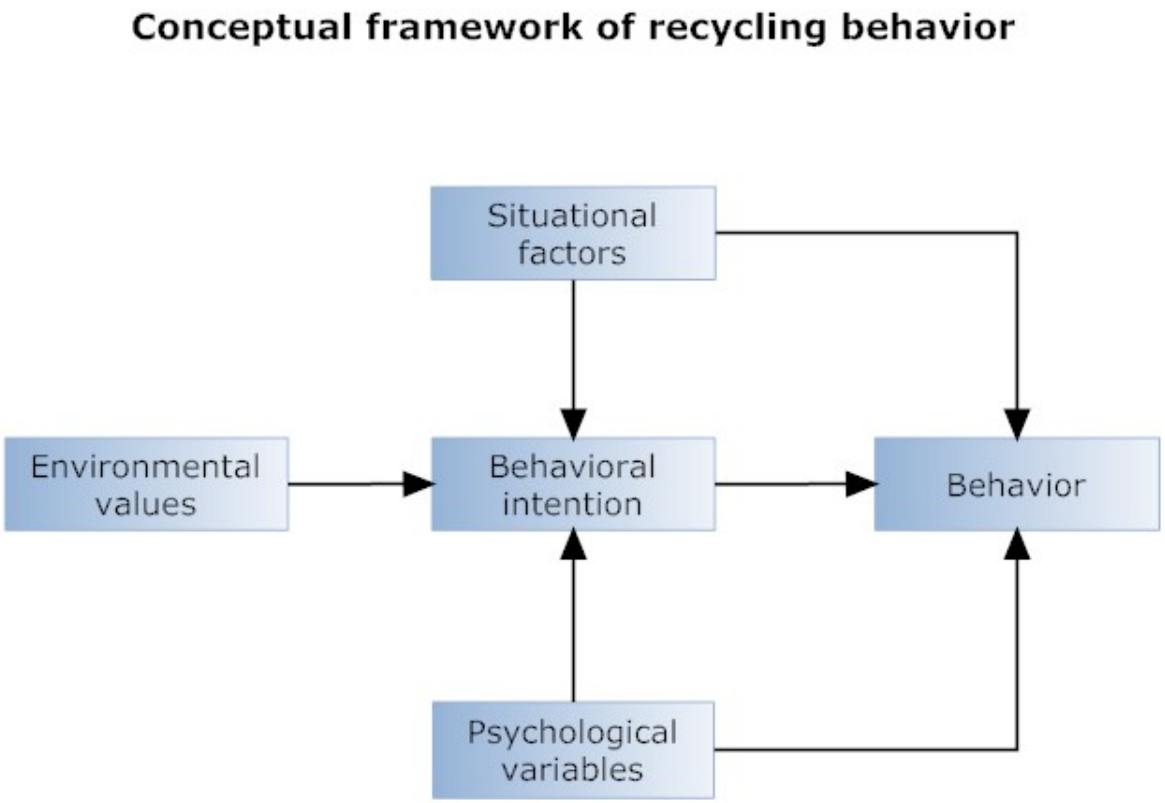

Figure 5. Conceptual framework of recycling behavior [30]

APPENDIX F

SWOT Analysis Template

Idea to assess: **RECYCLING STOCK MARKET USING INFORMATION & COMMUNICATION TECHNOLOGIES**

Strengths

(1) The core competence concerning the use of ICT to support the utility.
(2) The focused strategy for human resource management and development.
(3) The uniqueness of the utility.
(4) The key staff.
(5) Passion and dedication through innovative aspect.
(6) The surprise tactic.
(7) The Cost-Benefit relationship for the society (each entity).

Weaknesses

(1) The start-up cash-drain.
(2) The cashflow.
(3) The span of control in the case of quick expansion.
(4) An unknown utility may cause concerns to the public, at least during the introductory period (no brand awareness).
(5) There is no prior experience in this utility, as it will run for the first time (no position on the experience curve).
(6) Company's trade secrets and patents.
(7) Sustainability of the idea.

Opportunities

(1) Expansion of the idea in new regions, new markets.
(2) Improvement of the utility throughout time with the help of experience.
(3) Exploiting opportunities for franchising the idea.
(4) Strategic alliance with valuable and well-established companies.
(5) Participate in trade networks.
(6) Become a global player with global influence.
(7) Technological developments and innovations.

Threats

(1) New ideas are not always welcomed.
(2) Political situation and local community problems may cancel the effort (political & legislative effects).
(3) The reaction of the competitors, since this is not a mature market (competitors' intentions).
(4) Being number one means that you are a popular target locally and globally.
(5) Sustainable financial backing.
(6) Loss of key staff and partnerships.
(7) IT developments.