RADIOFREQUENCY IDENTIFICATION CURRENT AND PROSPECTIVE SCENARIO

Félix Larrañaga, Prof. Dr.
Anchieta University, UNINOVE e UNIMES, Brasil
larra@uol.com.br

ABSTRACT

Radio Frequency Identification Technology (RFID) that arose from World War II developments has become one of the most attractive management tools to the business environment yet has faced scarce current applicability. This study analyses the opinion of specialists engaged in the industry, trade and logistics management of diverse economic segments with views to presenting an amplified perspective of this technologies current and future behaviour, as well as its inclusion within the corporate environment. The subject matter of choice derives from the author´s personal curiosity, as leveraged by numerous publications that failed to reveal coincidental opinions and operational approaches concerning the use of this technology. This seems to have found ground given the lack of technical knowledge within both the business community and the public in general and, undoubtedly, considering it´s high implementation costs. The research, of bibliographical nature, concludes that effectively there are favourable and unfavourable opinions concerning this technology´s application at the surveyed industries and organizations, although most acknowledge its high potential business management efficiency and effectiveness. It is understood that only a favourable evolution of economic activities will promote the necessary investments and drive players into furthering in-depth studies concerning the varied RFID possibilities in addition to analysing the strategic convenience of its application.

Key-words: RFID. Logistics. Strategic Management. Supply Chains.

CENÁRIO ATUAL E FUTURO DA IDENTIFICAÇÃO POR RADIOFREQUÊNCIA

RESUMO

Uma das ferramentas de gestão de negócios de maior interesse para o mundo empresarial é a tecnologia de identificação por radio frequência (RFID), desenvolvida durante a Segunda Guerra Mundial e eficaz até hoje. Neste trabalho, analisa-se a opinião de especialistas da indústria, comércio e gestão logística de diversos setores econômicos com a finalidade de apresentar uma visão ampla sobre o comportamento atual e futuro dessa tecnologia, inclusive, sobre a possibilidade de incorporá-la ao ambiente empresarial. Justifica-se a escolha do tema pela curiosidade do autor, alavancada por diversas publicações nas quais não foi possível encontrar coincidência de opiniões, nem abordagens operacionais relacionadas à aplicação da tecnologia de identificação por radio frequência. Talvez, pelo elevado custo de implantação e desconhecimento da aplicabilidade de tal tecnologia por parte do empresariado e do grande público. A pesquisa, de cunho bibliográfico, leva a inferência de que existem opiniões favoráveis e desfavoráveis sobre a aplicação da RFID nas indústrias e organizações consultadas, embora, a maioria concorde com o elevado potencial de eficiência e eficácia do uso desta tecnologia na gestão dos negócios. Acredita-se que só uma evolução favorável das atividades econômicas promoverá os investimentos necessários para que se aprofunde os estudos sobre a aplicação RFID e analise-se a conveniência estratégica de sua utilização.

Palavras-chave: RFID. Logística. Administração estratégica. Cadeias de suprimento.

1 INTRODUCTION

There is a vast amount of literature presenting radiofrequency identification technology. It´s a resource that one might trace back to the Second World War period and to Sir Robert Alexander Watson-Watt´s studies concerning the development of radars.

This study poses to identify the perception of players engaged in the development and implementation of RFID. This perception is linked to what one might expect of RFID or with its short term forthcoming perspectives, both in the field of operational logistics as in its use in that of strategic business management.

RFID is an acronym of the name *Radio-Frequency Identification*. It comprises an automatic identification system via radio signals, recovering and storing data remotely by means of devices known as RFID tags.

A tag of this kind is a small object that may be placed on a person, an animal, a product or any other asset. The system enables tracking along supply chains given the placing of the mentioned labels on products, boxes, pallets, containers, vehicles and in any stock keeping unit (*SKU).*

The RFID system may substitute, in the midterm, the traditional barcode identification system but in the short term, and for low value products, this probably will not occur.

Labels are being printed with barcodes, texts for human reading and chips or transponders for intelligent reading, confirming the slow evolution of the new system and potential user mistrust.

One might expect a transition period during which both technologies shall coexist and that, as time goes by, the RFID technology shall supervene for asset tracking within supply chains. Graphically, a complete and operational identification system ought to present a configuration as pictured in Figure 1.

| DATA COLLECTION (RFID TAG) | → | INTERMEDIATION | → | APPLICATIONS WMS, TMS, YMS, ETC. |

Figure 1: Identification system

Source: prepared by the author

From a methodological standpoint, the study identified and consolidated results of several research works offered by the industry that presented the opinion and experience of executives, consultants, logistics operators and users of distribution systems managed by this device.

The core matter of investigation was determining the current level of acceptance and future utilization perspective of RFID. Fundamentally it was about investigating the "who, how and when" concerning the use of the system whilst also verifying the "who, how and when" as to the expected use, amongst those who hadn´t as yet done so.

As per the introduction, the theme rests upon the concern as to the evolution of a technology that is efficient in improving supply chain management that currently seems not to have conquered all.

This research utilised data from previous studies taken to effect by corporate and logistic study entities, which explains why it was difficult to consolidate all the information collected under a single behavioural pattern.

2 BIBLIOGRAPHICAL REVISION

The categories studied during the execution of this study, excluding knowledge in the technology per say, were: its applications, current state of the art, future outcomes for this identification system, characteristics concerning its implementation and challenges to be faced during the referred process. Information in classical logistics studies and concerning information technology application for the management of logistics and in supply chains, was complemented by data encountered in specialized publications such as the RFID journal and specialized consulting company reports.

2.1 APPLICATIONS

Most diverse, such as, for instance, in hospital activities, human implants, industrial, commercial use and in safety, toll systems, contaminated waste, maintenance, libraries, identification of objects, vehicles, people, animals and various others. Specifically as to supply chain management (SCM), the RFID system is key to the improvement of the managing of the physical flow of manufacturing, storage and distribution resources.

To characterize this technology´s potential, one might mention that the US Power Department, through the Argonne National laboratory, developed an active RFID system capable of tracking nuclear materials so as to protect human health, the environment and national security (RFID, 2009).

2.2 STATE OF THE ART IN RFID SYSTEMS

The fact that one might store information on an intelligent tag that does not call for the traditional optical reading system, does not imply that the market counts on a finalised, tested, operational and economic RFID identification system.

Unlike that which characterizes traditional barcode identification systems, intelligent tags do not require unidirectional optical readers or human labour. At warehouses or distribution centres, for instance, the entire logistics process can be automated (receive, store, separate and forward) enabling product flow through the warehouse or DC without calling for manual verification or that performed by readers. This is because an antenna can be set up on the corresponding building so as to capture information within intelligent tags fixed on the packages (RFID, 2009).

This enables the system to read, at a single shot glance, a package of mixed information irrespective of the SKU, boxes or pallets. However, the gross information thus obtained, given the absence of prior reorganization, does not offer any use in as much as identification is concerned that might allow for applicative reading and processing (Techexchange, 2009).

A farfetched possible application, once overcome the mentioned restrictions, might be typified by a supermarket customer for instance, pushing a cart full of purchases in front of an RFID device that would bill, invoice and order payment on a registered credit card, issuing the corresponding receipt. The same device would perform the traditional accounting and replacement functions that the barcode identification systems currently provide for. Savings would thus become more than merely brought to light. However, in the real world, information that is read ought to be forwarded to applications such as warehouse management systems (WMS), to those of transportation (TMS), yard (YMS) or others and to this effect, one must provide for an intermediate infrastructure that enables the interpretation, filtering and validation of data.

2.3 FUTURE RFID OUTCOMES

According to a Gartner (2009), specialized in the analysis of information in the field of technology, it was foreseen that in 2010 the RFID technology would be capturing over 3 billion dollars worth of investments. Christopher Lafond, Vice President at Gartner, mentioned that there is no correlation between the use of barcodes and the utilization of RFID tags, that is, it´s not because barcodes are intensely employed that this new technology would experience the same.

RFID technology will be catalysed by the fact that in certain places the use of barcodes proves to be impossible. The adoption of the RFID technology continues to grow and the level of expenditure in hardware and software increased in the last few years. Gartner analysts remind us that companies must not look upon RFID as a substitute to bar coding. Both technologies shall coexist, one or another being applied on an as needed basis.

2.4 ANALYSIS OF RFID IMPLEMENTATION AND USE

Having verified this technology´s recent past history within several industrial and commercial segments, a selection of studies were identified and in suit, researched results are made available.

2.4.1 Eyefortransport survey

This organization was founded in 1998 and has become world leader in the supply of transportation information and services. On a regular basis, it publishes reports on logistics, third party operators, intermodal transport operators and information technology (Eyefortransport, 2009).

This study was requested by several organizations amongst which Wal-Mart, Target, DoD, Tesco, Metro and others, and was undertaken by EyeforTransport so as to determine RFID system utilization strategies within transportation companies and other logistics activities. It also aimed at pinpointing the

same within the activities of their clients with views to determining the underlying reasons behind the decision to utilize the system and existing, identifiable implementation barriers (Eyefortransport, 2006). The results of this survey were presented at the 3rd. RFID Opportunities for Transport & Logistics Providers event, held in Arizona, USA in 2006, between November 30th and December 1ˢᵗ.

The sample comprised 54% of companies supplying technology, 3PLs (Third Party Logistics Operators) and logistics consulting services, 34% of companies involved in transportation, storage and/or distribution, and finally, 9% worth of manufacturing, retail and other corporations. Research results may be summarized as follows:

- ✓ The adoption and implementation of RFID solutions continues to grow slowly, having addressed 68% of those queried versus 62%, a year earlier. This figure portrayed growth mostly because of demands placed by customers, including Wal-Mart, P&G e FedEx (Jakovijevic, 2004).

- ✓ The total volume in question is comprised by 22% that already utilises or is ready to roll out their RFID solutions (19% in 2005), 14% that began the RFID pilot test stage (16% in 2005) and 32% that are engaged in research and definition of RFID strategies (27% in 2005).

- ✓ The major RFID users are third party logistics operators (3PLs), retailers and manufacturers, with the highest percentages in these segments effectively utilising the system.

- ✓ The main advantages or benefits identified by those questioned, were the improvement in efficiency, precision and in the transparency that the system incorporates to operations.

- ✓ These benefits are counterbalanced by the high cost of implementation, the lack of standardization within the industry and the belief or trust that other existing technologies (already duly paid for) might be capable of addressing demands.

2.4.2 Baird survey

The name BAIRD refers to the Robert W. Baird & Co. Organization. This is a consulting company founded in 1919 that, amongst other offerings, deploys information technology (Baird, 2009a).

In more recent studies, they confirm the trend mentioned as to the relevance of the RFID system, although some concern came over demand. According to surveys performed on 73 resellers in the field, in March 2009, the world crisis that took shape as of September/October 2008 triggered caution in investments and delays in the corresponding projects. Approximately 14% of respondents indicated incremental growth in their projects and 19% identified delays in at least three quarters of their projects.

2.4.3 ABI Research survey

This organization was founded in 1990 and devotes itself to market intelligence activities, having specialized in global connectivity and emerging technologies (ABI, 2009). It was the quest for profit, within the field of concern, which gave rise to research on the relevance of Return On Investment (ROI) in RFID purchase decisions (Logistics Management, 2009). In mid 2008, a study covering 185 organizations determined that approximately 37% of technology end users expected profits within the first year post investments. Details concerning replies compiled by ABI are presented in Table 1.

Table 1: ABI Research survey

TIME TO PROMOTE POSITIVE ROI	TOTAL%
Under 12 months	36,7
12 to 18 months	25,0
18 to 24 months	13,3
Over 24 months	6,7
Doesn´t know	18,3
Total (185 organizations)	100,0

Source: ABI (2009)

As per this same survey, the absence of a clear perception concerning the Return On Investment (ROI) models to be applied, in addition to the absence of real world data, promoted deceleration in the adoption of RFID technology. Simultaneously, researchers believe that the lack of user interest in sharing information would be one of the reasons impairing the formulation of ROI measurement models. To support the overcoming of the existing recession, a proactive exchange of information, concerning the obtaining of positive or negative results as to the implementation of RFID projects, would have to take place.

2.4.4 Capgemini survey

This company, that counts on branch offices in Brazil, is a consulting organization devoted to technology and, amongst its many and diverse activities, it performs investigations concerning RFID (Capgemini, 2009). In recent studies, they indicated that the financial crisis was one of the most influential factors on the agenda of supply chains for the year 2009.

The survey heard 300 industry participants holding upper level decision making responsibilities, 62% of which are based in Europe, 16% in the US and Canada, 13% in Asia and 5% in Latin America. Strategies in the field of logistics were strongly impacted by the crisis according to 65% of the total number of respondents and approximately 34% demonstrated concern with its very continuance given the current standing. The study reveals that the new financial-economic scenario that shaped as of 2008´s last trimester drives restlessness amongst all surveyed in as much as deceleration in business (65%), changes in customer requirements (46%), survival (37%) and the deepening of the globalization process (29%) are concerned. It specifically mentions the suspension of projects originally foreseen for 2009.

The five main projects identified by this research are IT related and the largest and most complex, such as investments in WMS and TMS experienced decreases in and around 20%. The detailing that follows pinpoints RFID technology perspectives in this segment, for the researched universe:

- ✓ Innovation in IT based storage (such as RFID) should decline some 30%

✓ TMS selection and implementation expect a 26% reduction
✓ Design and implementation of logistics solutions might present up to a 26% reduction
✓ WMS selection and implementation expect 23% less investments
✓ In advanced planning systems, a 16% reduction is estimated.

2.4.5 GMA survey

Given it´s relevance, one must mention this research jointly undertaken with IBM in 2008 (GMA, 2008). GMA address food, beverage and packaged consumer goods manufacturers that sell at groceries, department stores and supermarkets. The company was set up in 1999. This association groups companies with over 2 trillion dollars worth of revenue per annum, employing 14 million workers and contributing with 1 trillion dollars worth of added value to the North American economy. The research is named *"The 2008 Logistics Benchmarking Survey Report"* and comprises key practices, trends and operational benchmarks concerning the core supply chain activities of this industry.

Queried companies include organizations portraying annual revenues in the 500 million and over 20 billion dollars. Most of the 45 respondents sell some 1 to 5 billion per annum, whilst the sample´s annual average is in and around 3 billion dollars per company. Although the research is widespread and pertains to the increase in efficiency at a time of costs in logistics, for the purpose of this article, the portion of interest is that which relates to information technology.

The topic that deals with this matter refers to the fact that interest in the exchange of information remains unchanged since 2005 (when the last survey was conducted by this organization) and that EDI is used in a predominant manner and effectively executed, by respondents (97,37%). At the other extreme of information interchange instruments the so called scan based commerce appears with 38% of users (http://en.wikipedia.org/wiki/Scan-based_trading).

Research indicates that RFID technology remains as the least used alternative (46%) within the group of tools analysed. Extreme replies indicate that none were used (27%) or to a minor extent (57%). The reasons alleged by respondents were related to the effective implementation of RFID. In the ranking of information exchange instrument effectiveness, one comes across values mentioned in Table 2.

Table 2: IT instrument application

INSTRUMENT	EFFECTIVENESS (%)
EDI	97,0
ASN	97,0
Pallet guide	87,0
Data synchronization	94,0
Point of sales (POS)	96,0
RFID	46,0
Scan-based trading	38,8

Source: GMA (2008, p. 14)

To complete the framework presented by GMA´s research in as much as the RFID technology is concerned, replies concerning the main benefits and mid-term strategies for the use of intelligent tags are presented in Tables 3 and 4.

Table 3: Major RFID benefits

SUBJECT	(%)
Compliance	82,0
Reduce retail stock shortages	53,0
Improve commercial relations	41,0
Mitigate customer complaints	29,0
Minimize inventories	9,0
Improve distribution centre processes	6,0

Source: GMA (2008, p. 16)

Table 4: Intelligent tag use strategies

STRATEGY	(%)
Slap and ship	57,0
Carry both inventories (with and without tags)	31,0
Slap and ship (with and without EPC)	26,0
No decision on subject matter	23,0
Label all products	3,0

Source: GAMA (2008, p.15)

Use of the slap-and-ship or tag-and-ship mechanism consists in the placing of intelligent tags on items to be dispatched to clients that require this kind of identification system such as the US Defence Department and Wal Mart. Thus, some suppliers might adjust to demand addressing customers per their requirements without employing relevant time, effort and financial investments. This solution does not call for integration with management tools utilized by the supplier although one may decide to so proceed.

2.4.6 Eyefortransport survey

This organization´s most recent research – *The Logistics Technology Report* - presents a more optimistic perspective than those previously forecast, confirming the uncertain environment within which business is currently developed. A sample comprised of over 200 executives was questioned amongst shippers (manufacturers and retailers) and logistics and transportation companies (third party operators, storage and transportation companies for the three modals). The study aimed to establish the corporate drivers once before selecting technology solutions. Answers were separated into two groups: (1) shippers and (2) logistics and transportation operators. Table 5 summarizes replies obtained. Data presented in Table 5 confirm this group´s optimism, as mentioned, (when compared to the pessimism encountered in GMA´s research) covering the whole sample.

Table 5: Compiling of results

QUERY	ANSWER	SHIPPERS	TRANSPORTERS AND LOGISTICS OPER. (%)
Impact of crisis	Severe	54,0	97,0
Expects growth next year	Yes	64,0	64,0
Expects growth next year	No	36,0	36,0
Increase in IT investment	Yes	38,0	38,0
Reduction in IT investment	Yes	12,0	12,0
Maintains IT investment	Yes	50,0	50,0
Increase in IT investment with growth	Yes	43,0	43,0
Reduction in IT investment with growth	Yes	10,0	10,0
Maintains IT investment with growth	Yes	47,0	47,0
Increase in IT investment without growth	Yes	28,0	28,0
Reduction in IT investment without growth	Yes	16,0	16,0
Maintains investment in IT without growth	Yes	56,0	56,0
Which technology offers the best ROI	ERP/MRP	90,0	N/D
Which technology offers the best ROI	F/EM	60,0	N/D
Which technology offers the best ROI	IT Improvements	40,0	N/D
Best in terms of ROI	ERP/MRP	78,0	N/D
Best in terms of ROI	Visibility	33,0	N/D
Best in terms of ROI	TMS	22,0	N/D
Best in terms of ROI	WMS	24,0	N/D
Needs to improve	RFID	35,0	N/D
Needs to improve	TMS	32,0	N/D
Needs to improve	Visibility	28,0	N/D
Needs to improve	F/EM	21,0	N/D
Customer driven technology	Visibility	N/D	79,0
Customer driven technology	RFID	N/D	85,0
Customer driven technology	ERP	N/D	59,0
Customer driven technology	Portal Technology	N/D	56,0
Motivations	Improves Operational Efficiency	N/D	100,0
Motivations	Improves Customer Services	N/D	82,0
Motivations	Stimulates ROI	N/D	45,0
Motivations	Reduces MDO	N/D	36,0
Motivations	Direct Customer Requests	N/D	36,0
Motivations	Improves Data Quality	N/D	27,0
Motivations	Cargo Safety	N/D	9,0
ERP: Enterprise Resource Management; F/EV: Forecasting and Event Management; MDO: Labour force			

Source: Eyefortransport (2009)

As far as IT investment decisions are concerned, 88% of replies favoured maintenance and furthering upon growth and rose to 90% should there be growth in 2010.

In terms of RFID, answers that could have chosen more than one tool placed this technology on the outskirts of the ROI winners ranking (less than 10% of votes).

The top choices were ERP/MRP (78%), visibility technologies (33%), WMS (24%) and TMS (22%).

Furthermore, according to 35% of respondents, RFID technology is expected to improve, together with TMS (32%), visibility technology (28%) and forecasting and event management technologies (21%).

2.5 CHALLENGES

To leave behind experimentation and set a foot in the supply chain operational environment, the RFID system requires the solving of some critical issues as mentioned in suit:

- ✓ Make intelligent tag production feasible given that it still faces high costs. Manufacturing millions of units, the cost of one or two dollars each may decrease to 30 or 40 cents. Massive use may require billions of units enabling price decrease to a couple of cents per unit. Even despite this still representing a major impeding barrier to the expansion of the system, it might end up being a minor problem in the future.

- ✓ Solve one of the major barriers such as the lack of integration, once integration applications require high adjustment costs, so as to enable incorporation and processing of intelligent tag data, within existing systems.

- ✓ The development of an mediation system, capable of interpreting bulk data captured by the antennas. It might require a couple of years to become operational, call for tremendous investments and take into account that during the development period, it shall have to coexist with the traditional system and the new RFID.

- ✓ Develop filtering solutions for false or repetitive data that also require time and money.

✓ Define signal frequency and potency given that the system must be global and that there is an issue concerning the fact that they must be used on a world basis. This poses another problem to be tackled that calls for the negotiation of international agreements concerning wavelength and strength of the RF signal itself.

✓ Qualify corporate leaders in preparing policies, norms and procedures as to the quantity of data to collect from the RFID systems, defining which signals must be registered and ought to be ignored, keeping in mind that one must identify those that call for direction to transactional systems or to someone to effectively execute them. These policies, norms and procedures might eventually be coded and incorporated to the application logics of supply chain execution (SCE), or some other intelligent system based on business rules.

✓ Stimulate the exchange of information concerning project implementation. Helping partners and competitors incorporate into the new environment must generate mutual benefits.

3 METHODOLOGY

The method applied included the following steps: identification of the most relevant studies available as of specialized publications such as the *RFID Journal*, *Eyefortransport, Logistics Management, EAN/UCC* and consulting companies in the field of information technology; identification of representative studies in the retail, operational logistics and physical distribution industries; extraction of these researches, of contributions of consulted players; e presentation of results obtained informing the current situation and the application perspectives of these technologies.

4 DATA PRESENTATION AND ANALYSIS

Contributions, as identified and discussed in the literature revision session may be summarized as per Chart 1.

54% 3PLs, Technology suppliers Consultants	Determine RFID utilization strategies	3PLs Retailers Manufacturers	Eficiency Precision Transparency	High cost Poor standartization and mistrust in existing technologies	68% of respondents
185 users	Relevance of ROI in RFID purchase decision making	N/D	Generation of positive ROI	Setbacks: Do not know the ROI model, poor knowledge sharing levels	37%: 1st year positive ROI 25%: from 1 to 1,5 years 20%: + than 1 yr 18,3%: doesn´t know
45 companies w/ annual revenues between U$ 500 M and U$ 20 billion	Determine major benefits and strategies	3PLs Retailers Manufacturers	Comply w/ demand *Slap and Slip*	High cost and mistrust in existing technologies	Effectiveness of investment in IDE: 97,37% RFID: 46% Doesn´t Use: 27% Poor Use: 57%
300 participants 62%: Europe 16%: EUA/Canada 13%: Asia 05%: Latin America	Determine RFID use strategies	Apply IT in WMS, TMS, RFID, and APS	Efficiency Precision Transparency	2008/09 Crisis 65%: fall in business 46%: customer requirement change 37%: survival 29%: globalization	Suspension of investment projects
73 organizations	Determine RFID use strategies	N/D	Efficiency Precision Transparency	High Cost Poor standartization Mistrust in existing technologies	14% respondents present driving forces 19% present relevant delays
200 Executives	Determine perspectives of investment projects	3PLs Retailers Manufacturers	Generation of positive ROI	Implementation costs Mistrust	Poor Low

Chart 1: Opinion of players engaged in RFID usage

Source: prepared by the author

As of the evidence presented, it becomes apparent that the RFID technology is undergoing a development condition that counts on favourable and unfavourable opinions whilst displaying some lack of knowledge on behalf of potential users.

Along the text, industry experiences and opinions collected at six different surveys as summarized in the previous chart enable the pinpointing of player perceptions as follows:

a) Potential user mistrust that becomes apparent given the production of tags of diverse technologies so as to make up for eventual failures at the time of introduction of intelligent tag use, on an exclusive basis.

b) Coexistence of RFID and the traditional barcode system.

c) Slow growth in the adoption and implementation of RFID solutions.

d) Some shippers (Wal Mart, DoD, P&G, FedExp amongst others) demand from suppliers the provisioning of products that utilize intelligent tags.

e) Supplier attitude in meeting demand requirements under minimum effort conditions such as the mentioned slap-and-ship mode. In so doing, they proceed according to customer demands (82% of replies to the GMA survey).

f) Amongst the favourable opinions identified one might mention:

 – Improvement in the precision and transparency of inventories.

 – Reduction in the size of stocks, lack of merchandize and consequently improved provisioning of services to customers.

 – Production of a positive ROI during the first year RFID implementation.

 – Meeting of the demand in a compliant manner (despite resorting to incomplete procedures such as the mentioned slap-and-ship, utilised by 57% of the GMA sample). This concern drives decisions taken by 82% of those interviewed.

 – Persisting with IT investments, despite the crisis (88%). Should there be growth, positive responses rose to 90% (Eyefortransport, 2009).

 – Apparent willingness of third party logistic operators, retailers and some manufacturers in utilising this technology.

g) Amongst non-favourable opinions, that seem to predominate, one might mention :

- High cost and lack of tag and equipment standardizing.

- Spot effect of the financial-economic crisis that sprung as of 2008 (Baird, 2009a & Capgemini, 2009).

- Absence of a ROI measuring model resulting from RFID use.

- Lack of willingness to share experiences. Despite claimed as being an attitude of self defence, it results in the extension of the implementation period.

- Disruptive decrease (from 16 to 30%) in investments in innovative projects (Capgemini, 2009).

- RFID is the less utilised (46%) alternative, whilst EDI remains atop as per GMA´s survey. 27% don´t use RFID and 57% use it to a lessened extent.

- The RFID system in terms of ROI occupies the worst place amongst respondent expectations (<10%), whilst ERP and MRP rank atop in stated preferences (78%).

5 FINAL CONSIDERATIONS

The herein exposed presents a current standing that is partially favourable to a technology that would solve numerous problems but which implies in high development and implementation costs.

Furthermore, since September 2008, the global economy has immersed in a crisis that shall remain during the forthcoming years, discouraging new investments, although the market indicates that the worst is over and that potential users still remain expecting better days yet to come.

Although some of the analysed segments demonstrated their willingness to maintain and/or increment their investments in IT, the way the crisis developed, the lack of credit and high cost of equipment and accessories, shall supersede or postpone investments.

Consequently, doubt permeates RFID´s future outcome and will probably pick up as the economic global crisis that sprung as of the second semester of 2008, evolves. Thus, the massive incorporation of this technology in the corporate environment shall take place in not so close a future.

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