The First Intelligent Store in Brazil

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ABSTRACT

The First Intelligent Store in Brazil was developed since 1993 and since 2011, it was implemented at Billabong Store in Alphaville, São Paulo, Brazil as study case of a PhD. Inside the same space, it was implemented 15 applications that uses RFID, NUI, Mobility, Interactivity, all connected with an ERP that is integrated with Smart Self Checkout, Smart Loss Prevention, Smart Dressing Room, Smart Exhibitor, Smart Inventory, Smart Replenishment, Smart POS, Smart Shelf and other features that allows the store improve the manager and the customer experience. As a result, the store counts with the boost to the store´s traffic, fueled by curiosity about the new solutions that also led to higher sales. For the customers it was very important because the technology helped to reduce queues and improve the shopping experience. For the business it was wonderful because they could improve the receipt, inventory, loss preventions, products locations. The customers can play inside the smart dressing room that recognize the products and suggest others that coordenates with that one that customer bring inside the smart dressing room. It helps to know the habits of consumers and their expectations and it helps to increases the sale of products on impulse. The store is a big success in Brazil, because it was the first one that put everything together at the same place: RFID, NUI, ERP, Mobility, and we could prove the ROI with the technologies working together.

Keywords: (IT) Information Technology. AIDC (Automatic Identification and Data Capture). RFID (Radio Frequency Identification). Barcode. Biometrics. Retail. Loss Prevention. Inventory. Stock. EPC (Electronic Product Code) Processes. EAI (Enterprise Application Integrator).

INTRODUCTION

Customers shopping behavior will change more in the coming years than it did during the last one hundred (UNDERHILL, 1999). According to the author, the new consumer age provides an overwhelming amount of options, so that consumers will surely redefine markets in all sectors, requiring new products, services and sales channels.

Kotler, Hermawan and Iwansetiawan (2010) state that we live in the 3.0 Marketing Era, in which the behavior and attitudes of consumers will influence the business, since consumers will demand more collaborative culturally and spiritually marketing approaches. Highlighting that new technology will facilitate the dissemination of information, ideas and public opinion, which will allow consumers to work together to create value. The authors said that technology drives the rise of the creative market, whose worldview is more spiritual, requiring differentiated products and services.

This "new consumer" is more individualistic, independent and knowledgeable, with a lot of freedom to purchase (anytime, anywhere) besides being increasingly demanding and stressed. They are “omni-channel consumers” and because of it, they wants to use all channels simultaneously and retailers needs to track customers across all channels, not just one or two. He is more awareness about his power and rights and challenge the suppliers to provide him with more pleasant experiences, and he values his shortage of time, attention and confidence, resulting in greater need for convenience, authenticity and credibility, has greater geographic, ethnic and cultural diversity as a result of the increasing globalization of human society. He is concerned with environmental problems and issues of personal and social security. He is driven to acquire new, more complex and urgent knowledge, experiences, attitudes and feelings of self-confidence (Nascimento, 2010).

According to Mattar (2011), some events in the New Economy has brought new features to the Brazilian retail, such as: strong growth in e-commerce, demand for greater privacy by customers, full transparency, mega retailers globalization, neofrugalism, social responsibility, sustainability, efficient management, new store formats, new forms of communication, growth of own brands, growth of direct marketing, etc. Omni-channel consumers impact a lot the traditional retail (brick-and-mortar stores). In the brick-and-mortar channel, digitally-savvy consumers are entering stores already well-informed about a product’s features and prices, and expect store employees to know more than they do (Kilcourse, 2012).

Currently, trends in retail management are aimed at customization, differentiation, innovation, and especially a value added relationship with the customer. This requires the intensive use of technology to offer the customer more than he expects, surprising and captivating him, thus aiming his loyalty. (MATTAR, 2011).

Due to the change in consumer behavior, cheapening of technology resources, the constant search for quality improvement and competitiveness, globalization, new sales channels, it is therefore necessary to study the use of new technologies and IT tools that help enable the retailer to sell more and facilitate consumers purchases (SANTOS, 2006).

With competition just a click away, stores will have to be set up in prime locations with easy access and very good facilities. Fun is also an essential component, since retail and leisure are increasingly integrated. If the store did not have fun, surely it will be replaced by the competitor who has it. Thus, the act of going out shopping will be a leisure activity. The interaction between the product and the seller should be a moment of pleasure, in which the consumer will have the opportunity to get the quality of services according to his needs and technology should support it.

In short, retailers need to rewrite their brands, optimize their activities using technology and systemic intelligence, solve internal constraints especially in regards to people, systems and technology.

OBJECTIVE

The aim of this study is to identify the changes and possible gains in operational processes of the retail self-service stores, impacted by the use of Information Technology (IT) and Automatic Identification and Data Capture (AIDC) in world of omni-channel consumer.

To achieve this goal the key operational processes in a self-service retail store were studied focusing to identifying how AIDC and IT could help improve customer experience, operational performance and deliver business value.

STRUCTURE OF RESEARCH

The work consists of a literature review and rationale for its development, required to conduct the research. In this context, the following issues are addressed: Retail, IT applied to Retail; Automatic Identification and Data Capture (AIDC), Case Study and Conclusion.

RETAIL

To define the requirements of IT and AIDC to retail is essential to understand what is “retail”.

The "retail consists in the business activities involved in selling any product or provide any service to final consumers for use, personal, family and residential consumption" (MATTAR, 2011). Therefore includes: fast food, entertainment, laundry and health services and even furniture, cars and residential services. Being the last end of the chain adds value by including a set of business activities as it is in direct contact with the end consumer.

Marques (2004) points out that the most critical retail processes are: customer service, relationship management, purchasing and negotiating with suppliers, logistics and distribution, demand and inventory, operational efficiency and training of the staff, in addition to safety and loss prevention.

According to Marques (2004), inventory control will be increasingly necessary, so that the consumer finds the desired product exactly when he needs, and AIDC and IT can help a lot in all processes.

Hardgrave (2008) says that the inventory accuracy is one of the most important process at retail. Purchase order are based in inventory information that are lack of accuracy 65% of the time impacting revenues in 10%. Worldwide inventory inaccuracy average is 8% meaning a potentially 3.2% loss for retailers and 2.8% for manufacturers. Increasing inventory accuracy will help improve this issue.

In a world of omni-channel consumer, IT need to help retailers to transform the experience inside brick-and-mortar stores and retailers should use many of IT tools to offer the right product at the right place at the right time integrating all channels and transforming the shopping experience into something enjoyable and unforgettable.

INFORMATION TECHNOLOGY (IT) APPLIED TO RETAIL AND AUTOMATIC IDENTIFICATION AND DATA CAPTURE (AIDC)

The concept of Information Technology - IT - as an area of knowledge management emerged in Brazil around 70/80 and has been considered as one of the most important components of business environment at either strategic and operational level (ALBERTIN, 2005a; LAURINDO, 2002). IT enables retailers to improve their competitiveness and customize their products and services adding value to customers (Siqueira, 2004).

With the expansion of retailing activities, issues such as efficient management and intensive use of advanced information technology begin to play a more important role in the modernization of the distribution system and the Brazilian economy as a way to improve customer service that is more mature and demanding. In addition, an increasing share of income of these consumers has been used in entertainment, tourism and telecommunications, changing their purchasing profile (MATTAR, 2011).

Retail is one of the most important links in the supply chain and makes use of various technologies (MARQUES, 2004). Among them are: point of sale (POS), Enterprise Resource Planning (ERP), Customer Relationship

Management (CRM), system collaboration between suppliers process (as is the case of the ECR - Efficient Consumer Response), the exchange of data between all links of the chain (EDI - Electronic Data Exchange), and information systems for decision support and business intelligence (Marques, 2004).

Information Technology (IT) causes a direct impact on organizational processes. Graeml (2000) identified how organizations generally invest in IT, ie, what are the main organizational objectives, to be achieved with the use of IT in their processes. According to the author, they are: operational efficiency (at this level, IT helps to improve existing processes, focusing on improving its execution); organizational effectiveness (in this case, IT is used to refine processes, products and services); relationship with suppliers (in this regard, IT is used in order to reduce transaction costs and improving collaboration between companies); customer relationship (seeks customer retention, by knowing about them); competitive dynamics (the focus at this level is to add value to products and services and develop new distribution channels so that the competition can't copy quickly, creating barriers to new entrants); marketing support (use IT to help to identify market trends, prospecting new markets in order to increase the efficiency of searches); improvement of products and services (search is mass customization, by reducing the development time of new products); cost reduction in production (aim at increasing productivity, through quality improvement); business innovation (IT can be used to create new opportunities for business).

To Bolwijn and Kumpe (1990), the competitiveness must be analyzed. For the authors, the most important factors affecting the competitiveness are: cost, quality, time, flexibility and innovation. Efficiency refers to the ability of the organization to achieve its goals cost effectively, according to the resources available. Aims to provide quality products and services that meet the specifications and / or requirements in accordance with customer expectations. The time refers to the ability of the organization to respond quickly to new market requirements. Flexibility searches customization to meet the individualized needs of customers, i.e., the ability of mass customization in a wide variety of products and services, to meet the needs of customers on an individual basis. Innovation relates to the ability of the organization to develop products and / or services that are perceived as new by consumers.

According to Albertin (2008), the use of the IT benefits (cost, productivity, quality, flexibility and innovation) in corporate performance will take place by means of processes and strategies that are affected and supported by IT and that will compose this performance and are measured in order to form the structure of benefits of using information technology in the business environment.

In addition to the previously discussed information technology, retail also needs to use tools that streamline data capture, so that the benefits of cost, productivity, quality, flexibility and innovation can be evidenced. Because of this, it is useful to consider major technologies available for retail to enable automatic identification and data capture, or AIDC - Automatic Identification and Data Capture.

The Automatic Identification and Data Capture refers to the family of technologies that allow the automatic insertion of data into a computer or other microprocessor controlled system without using the keyboard, providing data accuracy, reducing human errors, cost of labor and time (GROOVER, 2011). AIDC refers to a category of technologies used to collect information from an individual, object, image or sound, without manual data entry (Agarwal, 2001). The AIDC include bar codes, biometrics, magnetic stripes, computer vision, Optical Character Recognition (OCR), smart cards, voice recognition and Radio Frequency Identification (RFID). The AIDC is also commonly referred to as "Automatic Identification," "Auto-ID," and "Automatic Data Capture." In retail, the Auto-ID systems are use to track products throughout the supply chain, from the manufacturer to the end consumer. In this case, one of the most interesting technology is RFID.

RFID or Radio Frequency Identification uses electromagnetic waves (radio signals) to transmit data stored on a microchip. This is a chip with antenna encapsulated in a label. Each chip stores a special number and a unique product (better known as EPC - Electronic Product Code). The code is read by means of antennas installed in the environment, which are usually integrated with the input and output systems of goods, but can be used in various applications throughout the supply chain. You can read data in labels on any type of element, such as: products, boxes, pallets, containers, assets, vehicles, animals, objects, machines and even people (PEDROSO; ZWICKER; SOUZA, 2009).

The RFID systems are based on three basic layers: (i) a transponder with an encapsulated chip in a physical object that can be identified; (ii) a reader, also known as interrogator, with his antenna which communicate with the transponder, without the need of aiming directly and (iii), a server, equipped with a RFID middleware that manages the device, filtering data and connecting with business applications (WAMBA; Boeck 2008).

According to Loebbecke and Wolfram (2004), the use of RFID technology will impact the entire distribution chain and can be used in pallets, cases and items, depending on the value of the products.

Hardgrave (2008) says that some studies on the application of item-level RFID in the retail fashion and footwear segment were performed, and concluded that the ROI is perfectly measurable. Tests concluded that the ROI is directly related to customer satisfaction, since the main causes of customer dissatisfaction is lack of stock, difficult to locate products and check out delays. Hardgrave (2008) argues that the applied RFID in an item level offers the opportunity to improve those problems.

Another problem for retailers is the location of products that also influences drastically in sales because customers can not find the products they are looking for, leaving the store without buying them. RFID can help find the goods, thus providing better services to customers and increasing sales (Hardgrave, 2008).

In loss prevention, RFID can help trace products and processes, it will improve visibility of all process of the store, such as: employee entrance, boxing disposal, waste, among others. So Hardgrave (2008) concludes that the main uses of RFID are: inventory accuracy, lack of inventory control, product localization and loss prevention, that are very important process to retail.

In summary, the key benefits provided by RFID technology are: (1) cost reduction of labor and time; (2) improvement in all processes which have become more efficient, faster or less complicated; (3) collaborative benefits, since the exchange of data between manufacturers and retailers allowed better visibility and planning; (4) increased accuracy over all processes; (5) interaction between customers and staff which increased the consumer satisfaction and sales due to the fact that they always find what they are looking for, customized services and shopping experience (Loebbecke, 2005).

To understand the impact of Information Technology and Automatic Identification and Data Capture in retail, the case study of Billabong was developed and will be reviewed below.

CASE STUDY: BILLABONG ALPHAVILLE

The first Intelligent Store in Brazil was opened in August 2011 at Iguatemi mall in Alphaville, São Paulo. It was developed and implemented by Vip-Systems Informática that is specialized in new technologies for retail, since 1993.

The Billabong, a sportswear clothing store, has a young clientele with an interest in Innovation, and they values innovations and understand that technology can provide a differentiated shopping experience.

Billabong implemented a total of 15 VIP-Systems applications, all integrated in the store, which carries about 5,000 items on the sales floor. The RFID applications the Vip-Systems developed in the last 12 years, include features such as a ERP integrated with Smart Self Checkout, Smart POS, Smart Loss Prevention, Smart Dressing Room, Smart Logistics, Smart Exhibitor, Smart Inventory, Smart Replenishment and others features that can improve the interactivity and the mobility of customers and employees.

One of the interactivity solutions that was implemented, it is called as an "Interactive Mirror," which allows customers to take pictures of themselves wearing a pair of sunglasses, write messages on a touch screen mounted in a kiosk and send the photos to a social network or e-mail. In the same kiosk, the customers can play with some interactive games and they can ready they're QRCode to check if they earned a discount or a gift. They can either play with augmented reality; all integrated in the same space and kiosk.

The other technology that customers likes a lot is the Intelligent Catalog that can show the products using NUI (Natural User Interface). As they move theirs hands, they can see all the products.

In Billabong's store were used three RFID interrogators, one handheld reader for staff to conduct inventory of its products in the back room and in the sale floor; one fixed reader with multiple antennas for the Smart Dressing Room, Smart Exhibitor and Smart Shelves applications, and one with multiple antennas to read tags at the point of sale and at the front door, for loss preventions that was integrated with cameras.

Once items are received via RFID, the data can then be stored on the store's back-end system. They did the

inventory check of all items in the back room and in the sales floor with the handheld reader by passing the reader past each product. While typically an inventory check of the back room takes staff about six to nine hours, with RFID they did in 45 minutes.

The store is also equipped with Smart Shelves with RFID antennas that reads the ID numbers of tags and store that data to provide a real-time inventory count that indicates where each item is on the sales floor, and whether any items need to be moved because they have been miss shelved. Everything is displayed on an Ipad or other mobile hardware connected in WI-FI.

The Smart Exhibitor system allows customers to learn more about the items they are viewing in the store. When a customer remove an item from the shelf and hold the tag next to a RFID antenna, the systems identify the ID number and shows in an IPAD informations about other products that might best accompany that item, and the place that it is inside the store.

One of the most exciting solution is the Smart Dressing Room. When customers bring garments into the dressing room, an RFID antenna, that is at ceiling captures the ID numbers on tags attached to those items, and shows the informations in a touch screen.

A touch screen on the dressing room mirror then displays products that coordinate with those brought into the room, as well as colors and sizes available in the store. A customer can then press a prompt on the screen to send a text message to the mobile phone of a staff member to request additional items, or can put everything in the cart and finish the shop inside the dressing room.

At the POS System, an RFID antenna installed under the payment place reads tags of items placed on the counter for the purpose of being purchased and sends that information to the software, that reads all tags, shows the picture and product informations, and lets make the payment in various forms (cash, check, card, NFC, etc.). It is also integrated with the store's inventory management system, which then updates sales data by moving the tag's ID number from the "unsold" category, to "sold." An Intelligent Deactivator function also allows a customer to have the tag deactivated by staff, using a kill command to turn off the tag's transmission functionality.

Finally, when the customer exits the store, an RFID antenna captures the tag ID numbers and checks their status in the inventory management system. If, by chance, the system determines that someone leaves with a product not paid for, the system will trigger an audible alarm and will record a video of the incident.

SOME OF RESULTS

The store's director, Marcelo Chiaparini, says the boost to the store's traffic, fueled by curiosity about the technology and how it was being used, also led to higher sales.

For the Ph.D some tests were performed in store. Just to have an idea, the gains in sales processes were amazing. With the bar code, the time used to read 12 items it was 1 minute and 06 seconds, while the same reading with RFID was in 42 seconds, and is therefore 35.22% on average more quickly, which will reduce queues and improve the shopping experience.

The time of receipt of product was also reduced considerably. The average receipt with a barcode was 44 seconds while that with RFID was 1 second for each 12 products received, with an average gain of 97.72% productive.

In the process inventory, tests were conducted using a fixed quantity of products (100). Three surveys were conducted, using one (1) mobile reader Barcode and same collector equipped with RFID reader, ie, the collector had the two technologies and embedded software collection, was also the same.

It was verified that 100 products RFID technology is, on average 23.70 times faster than the barcode.

This difference tends to increase because "the greater the amount of inventory of products, the higher the reading time using bar code." Reading time with RFID may also increase under these conditions, but in a very slow and insignificant compared with the variation of time using bar code readers.

The case study also showed the Billabong critical points for successful implementation of IT and AIDC in retail. Regardless of the type of technology that will be implemented, it was found by the pilot, which will need to consider the following aspects:

PROCESSES

Complete revision of processes, due to the advantages and disadvantages of AIDCs
How to introduce the technology into a new store?
How to introduce the technology in a store in operation?

HARDWARE

What kind of reader to use and where and how to post it?
What kind of antennas are the most suitable for the project?
What and how many connectors should be installed?
Making the integration of peripherals such as: CFTV, Barcode, Mobile Collector, Mobile Phones, Printers, Wireless, Multi touch screens, etc.

SOFTWARE

Making the integration with the legacy system? What points will be impacted?
What should be adapted in the modules of EAI / EDI - to feed the new modules in place and make the management of legacy and new applications?
What drivers, SDKs, DLLs, and others should be installed in the store to make the system work properly?
What customizations are needed to meet business objectives?

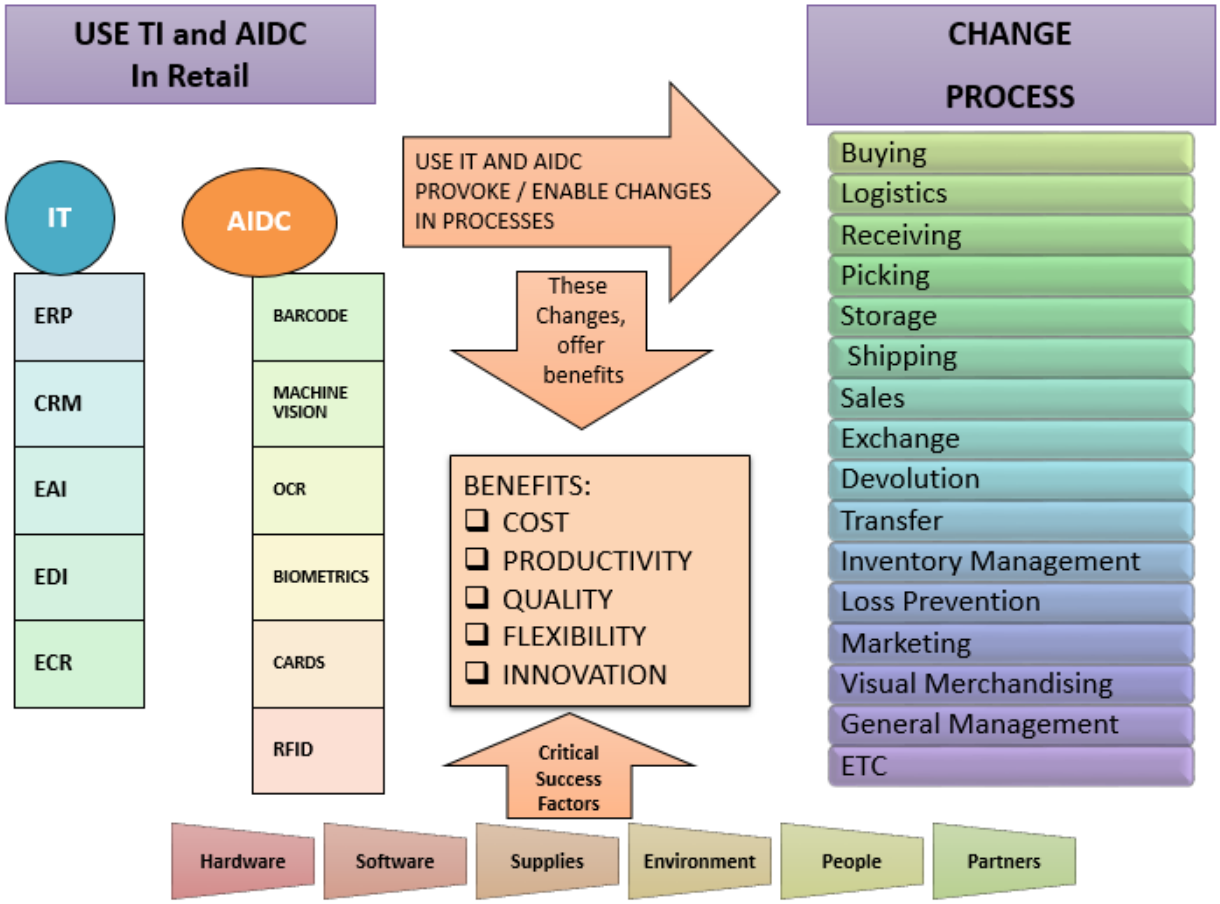
LABELS / SUPPLIES

How to select the best type of encapsulation?
Which vendor?
What is the scope and range of reading that will be needed for the project?
What is the ideal format for each type of label product?
What data should be stored?
What patterns and what kind of key security and encryption is used?
How will the antitheft control?
With respect to pricing, you must set: Who will post?; As will be posted?; When will be posted?; Who will guarantee the quality?; How to ensure that will not be lost?

ENVIRONMENT / INTERFERENCE

What are the types of furniture and objects that will be used in store? What types of materials used in store in terms of floor, walls, furniture and what its possible interference in the reading?
What are the technologies that will run concurrently? What are the possible impacts on RF?
What kind of lighting will be used?
What kind of network (wired or wireless)?

Thus, one of the contributions of this work is to warn the critical success factors experienced throughout this case study and demonstrate that the use of IT and AIDC may impact the business and generate benefits for businesses, since they are regarded as factors hardware, software, people, suppliers, inputs and environment. The Scheme 1, shows the Benefits and Critical Success Factors for the use of AIDC IT and retail:



Scheme 1 - Benefits and Critical Success Factors for the use of AIDC IT and retail.
Source: Romano,2011.

CONCLUSIONS

This work was limited to studying the key operational processes in a self-service retail store with a view to identifying how technologies Identification and Automatic Data Capture and IT can help it improve customer experience and its operating results.

It was possible to study the combination of IT, RFID technology and others AIDC are imposing a new format retail business. Leverage the mobility of consumers with the ease of the Web and with smartphone features, opens new opportunities to boost sales. Knowing the habits of consumers, their preferences, their expectations and have earned their trust, provide the sale of products on impulse.

As a result, the store counts with the boost to the store´s traffic, fueled by curiosity about the new solutions that also led to higher sales. For the customers it was very important because the technology helped to reduce queues and improve the shopping experience. For the business it was wonderful because they could improve the receipt, inventory, loss preventions, products locations. The customers can play inside the smart dressing room that recognize the products and suggest others that combines with that one that customer bring inside the smart dressing room. It helps to know the habits of consumers and their expectations and it helps to increases the sale of products on impulse.

For future works, it will be important to analyze the use of AIDC and IT throughout all processes of the supply chain, not just in the store, since during the research and literature review, it can be seen that we are at the beginning of a significant change on businesses that tend to "collaborative chain", where all the links are mutually help to reduce costs. These technologies can positively impact the development of this new model.

Because it was an innovative project and have a few similar studies in Brazil and other countries, since in a single environment brought together various technologies in an integrated manner in order management, interactivity, entertainment, mobility and convergence of multiple channels (as is the case of the store, internet and social networks), the store attracted the media from different parts of the world!

REFERENCES

Agarwal, R.; Prasad J. The role of innovation characteris TI and perceived voluntariness in the acceptance of information technologies. Decision Science, v. 28, p. 557-582, 1997.

Agarwal, R.; Karahanna, E. Time files when you´re having fun: cognitive absorption and beliefs about information technology usage. MIS Quarterly, v. 24, n. 4, p. 665-694, 2000.

Agarwal, Vivek. Assessing the benefits of Auto-ID Technology in the Consumer Goods Industry. Cambridge University Auto-Id Centre - Institute for Manufacturing, University of Cambridge, Mill Lane, Cambridge, cb2 1rx, uk, CAM-AUTOID-WH-OO3, 2001. Disponível em: <http://ken.mit.edu/whitepapers/CAM-WH-003.PDF>. Acesso em: 23 jul. 2011.

Ajzen, Icek; Fishbein, M. Understading attitudes and predicting social behavior. New Jersey: Prentice Hall, 1980.

Albertin, Alberto Luiz. Administração de informática: funções e fatores críticos de sucesso. São Paulo: Atlas, 2004.

Albertin, Alberto Luiz. Tecnologia de informação e desempenho empresarial: as dimensões de seu uso e sua relação com os benefícios de negócio. São Paulo: Atlas, 2005a.

Albertin, Alberto Luiz. Benefício do uso de tecnologia de informação no desempenho empresarial. Projeto de pesquisa desenvolvido com o apoio do Núcleo de Pesquisa e Publicação (NPP) da Escola de Administração de Empresas de São Paulo (EAESP) da Fundação Getulio Vargas (FGV). Relatório 07/2005. São Paulo: FGV-EAESP, 2005b. Disponível em: <http://www.eaesp.fgv.br/AppData/GVPesquisa/P00319_1.pdf>. Acesso em: 04 set. 2011.

Albertin, Alberto Luiz. A evolução que revolucionará. HSM Management, São Paulo, a. 10, v. 5, n. 58, p. 22-28, set./out. 2006.

Albertin, Alberto Luiz; albertin, Rosa Maria de Moura. Benefícios do uso de tecnologia de informação para o desempenho empresarial. Rev. Adm. Pública [online]. v.42, n.2, p. 275-302, 2008.

Angeles, R. RFID technologies: supply-chain applications and implementation issues. Information Systems Management, v. 22, n. 1, p. 51-65, 2005.

Asif, Z.; Mandviwalla, M. Integrating the supply chain with RFID: A technical and business analysis. Communications of the Association for Information Systems, n. 15, p. 393-427, 2005.

Billabong, International Limited. Full Financial Report 2010-2011. Disponível em: <http://media.corporate-ir.net/media_files /IROL/15/154279/NoticeofAnnualGeneralMeeting ProxyForm.pdf>. Acesso em: 08 out. 2011.

Billabong. Informações gerais sobre a empresa. Disponível em: <http://www.billabongbiz.com/phoenix.zhtml?c=154279ep=irol -homeprofile>. Acesso em: 08 out. 2011.

Bolwijn, P.T.; Kumpe, T. Manufacturing in the 1009´s. Productivity, flexibility and innovation. Long Range Planning, v. 23, n. 4, 1990.

Collins, J. Metro readies RFID rollout. RFID Journal, jan. 13, 2004a. Disponível em: <http://www.rfidjournal.com/ article/ articleview /734/>. Acesso em: 02 jul. 2010.

Drucker, P.F. A nova sociedade das organizações em aprendizagem organizacional: gestão de pessoas para inovação contínua. Harvard Business Review: Campus, 2000.

Drucker, P.F. The discipline of innovation. Harvard Business Review, Boston, v. 8. n. 8, p. 95, ago. 2002.

Drucker, P.F. Innovation and entrepreneurship: practice and principles. Elsevier, 2004.

Dutta, A., Lee, H. L. and WHANG, S.. RFID and Operations Management: Technology, Value, and Incentives. Production and Operations Management, 16: 646–655. doi: 10.1111/j.1937-5956.2007.tb00286.x, 2007

Ekstam, H.; Karlsson, D; Orci, T. Customer relationship management: a maturity model. 2001. Disponível em: <http://www.crm -forum.com>. Acesso em: 24 ago. 2011.

Epc. A Shared Vision for Transforming Business Processes – IBM e Global Commerce Initiative. Finkenzeller. K. RFID Handbook. 2. ed. Akron: John Wiley e Sons, 2005.

Epcglobal. The EPCglobal Network: overview of design, benefits and security. Position paper, EPCglobal, 2004.

Epcglobal, Inc. Driven standards for the Electronic Product Code™ (EPC) to support the use of RFID. Disponível em: <www.epcglobalinc.org>. Acesso em: 02 jul. 2010.

E.W.T. Ngai et al. RFID research: An academic literature review (1995-2005) and future research directions. Int. J. Production Economics, n. 112, p. 510-520, 2008.

Fosso, S.; Wamba, primeiro nome, et al. Exploring the impact of RFID technology and the EPC network on mobile B2B e Commerce: A case studying the retail industry. Int. J. Production Economics, n. 112, p. 614-629, 2008.

Gaukler, G.M. RFID in supply chain management. Ph.D. Thesis, Stanford University, 2005.

Graeml, Alexandre R. Sistemas de Informação: O alinhamento da estratégia de TI com a estratégia corporativa. São Paulo: Atlas, 2000. 135p.

Greenberg, Bob. Reinventing retail. Mediaweek. Academic Research Library, p.16, feb. 15, 2010.

Groover, Mikell P. Automação industrial e sistemas de manufatura. Rio de Janeiro: Pearson Universitários, 2011.

Hardgrave, B.; Waller, M.; Miller, R. RFID's impact on out of stocks: a sales velocity analysis. White Paper, Information

Technology Research Institute, Sam M. Walton College of Business, University of Arkansas, 2006. Disponível em: <http://itrc.uark.edu/research/display.asp?article=ITRI-WP068-0606>. Acesso em: 27 jun. 2010.

Hardgrave; Miller, R. The Myths and Realities of RFID. International Journal of Global LogisTI e Supply Chain Management, v. 1, n. 1, p. 1-16, 2006.

Hardgrave, B. Melhorando a Visibilidade de Itens com RFID – Estudos do Wal-Mart, Dillard's, American Apparel. III Simpósio RFID. São Paulo, 2008. Disponível em: http://www.rfid-coe.com.br/simposio2008/content/pt_hardgrave.html. Acesso em 27 jun. 2010.

Jones, A. K. et al. Passive active radio frequency identification tags. International Journal of Radio Frequency Identification Technology and Applications, v. 1, n. 1, p. 52-73, 2006.

KAPLAN, Robert S.; NORTON, David P. Mapas estratégicos: convertendo ativos intangíveis em resultados tangíveis. 2. ed. Rio de Janeiro: Campus, 2004.

Kilcourse, Brian. Retail Systems Research "Gaming Google: The Growing Importance of Omni-channel", Retail Systems Research, 1 March 2011. Retrieved on 15 November 2012

Kim, E. Y. et al. Comparison of benefits of radio frequency identification: Implications for business strategic performance in the U.S. and Korean retailers, Industrial Marketing Management, doi: 10.1016/j.indmarman. 2008.01.007.

Kim H. J.; Kim, E. Y. An exploratory study of RFID benefits for apparel retailing. Journal of the Korean Society of Clothing and Textiles, v. 30, n. 12, p. 1697-1707, 2006.

Kirti Chopra. Physics behind RFID smart card security in context of privacy. THE UNIVERSITY OF TEXAS AT ARLINGTON, May 2010. Disponível em: <http://dspace.uta.edu/bitstream/handle/10106/4948/ Chopra_uta_2502M_10684.pdf?sequence=1>. Acesso em: 23 jul. 2011.

Koh, C. E.; Kim H. J.; Kim, E. Y. The impact of RFID in retail industry. Issues and critical success factors. Journal of Shopping Center Research, v. 131, n. 1, p. 101−117, 2006.

Kotler, Philip; Hermawan, Kartajaya; IWAN, Setiawan. Marketing 3. As forças que estão definindo o novo marketing centrado no ser humano. Rio de Janeiro: Elsevier, 2010.

Kotler, Philip. Administração de marketing: a edição do novo milênio. São Paulo: Prentice Hall, 2000.

Laurindo, F.J.B. Tecnologia da informação: eficácia nas organizações. São Paulo: Futura, 2002.

LEE, L.S. et al. Radio frequency identification (RFID) implementation in the service sector: A customer-facing diffusion model. Int. J. Production Economics. p. 587-600, 2008.

Loebbecke, C., Wolfram, G. Taking Content Integration to the POS: Enhancing Shopping Convenience in Metro's 'Future Store'. Society of Information Management (SIM) Paper Award Competition, 2004.

Loebbecke, C. Modernizing Retailing Worldwide At the Point of Sale. MIS Quarterly Executive, v. 3, n. 4, dez. 2004.

Loebbecke, C. Rfid Technology And Applications In The Retail Supply Chain: The Early Metro Group Pilot. Bled Econference Eintegration In Action Bled, 18., Slovenia, June 6 - 8, 2005.

Malhotra, Yogesh. What is knowledge management? São Paulo, 2010. Disponível em: <www.brint.com/km>. Acesso em: 19 jul. 2010.

Marques, E.V.; Moura, R.M.; Albertin, A.L. A tecnologia de informação e o varejo brasileiro. In: FELISONE, Cláudio de Ângelo; SILVEIRA, José Augusto Giesbrecht (Orgs.). Varejo competitivo. São Paulo: Saint Paul Institute of Finance, v. 8, cap. 2, p. 47-73, 2003. Coletânea de Artigos do Prêmio PROVAR.

Marques, E.V. O uso da tecnologia de informação nas organizações. Um estudo no varejo de moda no Brasil. 2004. Tese (Doutorado) -Escola de Administração de Empresas de São Paulo, Fundação Getulio Vargas.

Marques, Érico Veras. O uso da tecnologia da informação no varejo brasileiro: um panorama na visão de especialistas e executivos. FGV-EAESP/GVPESQUISA. Relatório de Pesquisa n. 28, 2004

Martins, Eliane Ferreira. Gestão de estoques. Administração de Materiais. 2009. Disponível em: <http://www.administracao.ufcg.edu.br/adm_rec_mat_pat/Apostila%20Gestao%20de%20 Estoques%202009.2.pdf>. Acesso em: 21 jul. 2011.

Martins, Vitor. Integração de sistemas de informação. Perspectivas, normas e Abordagens. Universidade do Minho: Edições Sílabo, 2006.

Mattar, Fauze Najib. Administração de varejo. Rio de Janeiro: Elsevier, 2011.

Meirelles, F.S. Pesquisa: Administração de recursos de informática. 22. ed. São Paulo: Escola de Administração de Empresas de São Paulo, 2011.

Nascimento, José Rafael. Nova economia, novo consumidor. São Paulo, 2010. Disponível em: <http://www.mettodo.com.br/pdf/Nova_Economia_Novo_ Consumidor.pdf>. Acesso em: 15 jul. 2010.

Pedroso, Marcelo Caldeira; Zwicker, Ronaldo. Gestão da informação de produtos: base para os relacionamentos na cadeia de suprimentos. Revista de Gestão da Tecnologia e Sistemas de Informação. DOI: 10.4301/S1807-17752008000100006. Journal of Information Systems and Technology Management, v. 5, n. 1,p. 109-134, 2008.

Pedroso, Marcelo Caldeira; Zwicker, Ronaldo; Souza, Cesar Alexandre. A adoção de RFID no Brasil: Um estudo exploratório. RAM – Revista de Administração Mackenzie, v. 10, n. 1, jan./fev. 2009.

Romano, Regiane Relva. Os impactos do uso de tecnologia da informação e da identificação e captura automática de dados nos processos operacionais do varejo / Regiane Relva Romano. - 2011.

Santos, S. L. Tecnologia da informação na competitividade e gestão de lojas de departamentos de vestuário e moda. 2006. Dissertação (Mestrado). Departamento de Engenharia de Produção, Universidade de São Paulo, São Paulo.

Simon, Hodgson. Farhad, Nabhani; Sara, Zarei. AIDC feasibility within a manufacturing SME. Assembly Automation, v. 30, n. 2, 2010.

Sorescu, Alina; Frambach , Ruud T.; Singh, Jagdip; Rangaswamyd, Arvind; Bridges, Cheryl. Innovations in retail business models. New York University. Published by Elsevier Inc. Journal of Retailing 87S (1, 2011) S3–S16.

Underhill, Paco. Vamos às compras: a ciência do consumo. São Paulo: Campus, 1999.

Wamba, samuel fosso; lefebvre, louis a.; lefebvre, Elisabeth. Enabling intelligent B-to-B eCommerce supply chain management using RFID and the EPC network: a case study in the retail industry. In: ICEC'06, Aug. 14-16, 2006, Fredericton, Canada. ACM 1-59593-392-1, 2006.

Wamba, Samuel Fosso; Boeck, Harold. Enhancing Information Flow in a Retail Supply Chain Using RFID and the EPC Network: A Proof-of-Concept Approach. Journal of Theoretical and Applied Electronic Commerce Research, v. 3, Iss. 1, apr. 2008, p. 92-105. Universidad de Talca – Chile, 2008.

Wan, Harun; Loh, Chee Hong. Development and implementation of radiofrequency Identification (rfid) technology for inventory management system: a case study. Journal Mekanikal, n. 27, p. 51-68, dec. 2008.

Zhao, Xiaohui; Liu, Chengfei; Lin, Tao. Incorporating business process management into RFID-enabled application systems. q Emerald Group Publishing Limited 1463-7154, DOI 10.1108/14637151011093008. Business Process Management Journal, v. 16, n. 6, p. 932-953, 2010.

Zhu, Yong; Tan, Tieniu; Wang, Yunhong. Biometric Personal Identification Based on Iris Patterns. National Laboratory of Pattern Recognition (NLPR), Institute of Automation, Chinese Academy of Sciences. Beijing 100080, P. R. China, 2000, p.801-804, v. 2.

Zwicker, Ronaldo; De Souza, Cesar Alexandre; Vidal, Antonio Geraldo Da Rocha; Siqueira, José de Oliveira. Grau de informatização de empresas: um modelo estrutural aplicado ao setor industrial do Estado de São Paulo. RAE-Eletrônica - v. 6, n. 2, Art. 13, jul./dez. 2007. Disponível em: <http://www.rae.com.br/eletronica/index.cfm?FuseAction =ArtigoeID=4075eSecao=ARTIGOSeVolume=6eNumero=2eAno=2007>. Acesso em: 10 jul 2010.