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Exam Capita Selecta Business Informatics (CSBI)
29/05/2007, 08:45-11:30

Instructions (please read carefully):
- *This is a closed book exam. It is not allowed to consult other materials than this exam. Switch off mobile phones and store them in a closed bag.*
- **Write the answers on this document.** *Use the textbox after each question for your answer. It is not allowed to write outside the box.*
- *It is very important that we can read your handwriting.*
- **State on every sheet your name and student number**
- *The language for answers is English or Dutch.*
- *The grade for this exam is the sum of the scored points divided by 10.*
- *The grade for the course CSBI = 0.3*presentation + 0.3*paper + 0.4*exam*
- *We publish the mark for the course CSBI in total. (so not the individual result for this exam)*
- *This exam contains 16 pages*

Additionally:
- *All rules for writing papers (as discussed during the CSBI lectures) apply also to the answers on exam questions.*
- *Finishing the exam in time requires time management. Be sure to divide your time over the questions in an appropriate way.*
- *For the review questions, it is strongly advised to make already notes of comments while reading the papers*

Success!

This exam contains one question about your own paper (34 points), and two review assignments of papers (33 points per review).

Question 1 (34 points)
   a. Concisely state the claim of your paper? (8 points)

   b. Criticize your own claim (note: do not criticize the correctness of the claim *itself*). How can your claim be improved? (13 points)

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c. Provide **two distinct** arguments that refute your reasoning for your claim (and hence refute your claim). (13 points)

1. ...

2. ...

Question 2 (total 66 points)
Discuss the two attached articles using the attached review forms. Per review 33 points.

It is improbable that IT can bring sustainable competitive advantage

Abstract

It is a common view that IT can generate value for a company. In the short term this extra value could provide a (temporary) competitive advantage. But we question the proposition that IT is able to produce sustainable competitive advantage. One of the reasons for the inability to create sustainable competitive advantage is that IT is easily accessible and reproducible. IT in business environments is more reproducible because off several developments. These developments are reducing costs, standardization and the focus on following best practices. These developments lead to homogenization of IT. To create a sustainable competitive advantage, it will not be enough to simply invest more in IT alone. It is only a matter of time before most competing companies will have the same standard processes and process support. We suggest that the investment in IT should be combined with investments in the management functions or other business functions to gain a sustainable competitive advantage. With this paper we hope to contribute to the discussion of value creation (for companies) by means of IT.

1   Introduction

Before the 90's the dominant view of IT was an optimistic one (Clemons, 1991, Feeny and Ives 1990). A multitude of studies showed that IT could provide a strategic competitive advantage. However in the 90's this optimistic view has been challenged (Powell et al., 1997). We define competitive advantage as an advantage that one firm has relative to competing firms (e.g. strong brand name, patents, lower manufacturing costs etc.). If a company aims to create a durable strong position in their market, the competitive advantage must be sustainable and not temporary.

IT in our context contains the mere hardware and software that a company could use. To be specific: the technologies used for processing, storing and transporting information in digital form (Carr, N.G., 2003).

In the section on the relation between IT and competitive advantage we discuss trends in IT that influence the potential for competitive advantage. We discuss the relationship between four business functions and competitive advantage. We conclude that for IT to become a source of sustainable competitive advantage, investment in IT should be combined with investments in management functions or other business functions.

2   Why IT is improbable to create Competitive Advantage

The following arguments will show why, in contrast to the traditional view, it is unlikely that IT is a source for sustained competitive advantage.

2.1   IT is broadly accessible and affordable

An increasingly popular line of thought entails that IT is in essence an infrastructural technology. Infrastructural technologies can give competitive advantage to companies when they are the first or the only ones successful in applying it. What we see today is that IT has become broadly accessible and affordable. Therefore, a company will barely gain advantage over its competitors from the application of information technology (Carr, 2003). Since IT is so accessible, most companies cannot gain sustainable competitive advantage from the application of IT because information technology is available to almost all companies in competitive markets (Powell et al., 1997).

In his response to Carr's article, Strassman states that the broad accessibility of IT only adds more value as it opens up opportunities for firms to cooperate. Although at first this seems to be

a counterargument, it actually is not. The advantage is not unique to any one company but available to all, thus negating any possible competitive advantage.

2.2 Standardization of applications

The applications used in information technology are becoming standardized. In the early years of information technology it was a widely accepted practice for companies to develop their own custom applications. By shifting to the use of off the shelf software, companies have been able to cut costs and focus on their core competencies. What we see today is that most companies are standardizing on a small set of business applications (e.g. SAP for ERP applications). This leads to a situation where using these applications is no longer a source of competitive advantage (Carr, 2003).

2.3 Converging Best Practices

A lot of companies base their information technology strategy on industry best practices. Companies adapt what is generally considered as best practices for their own implementations or business process reengineering (Carr, 2003). This is a successful strategy from the perspective of reducing risks. The downside, however, from a more general business perspective is that this strategy also leads to companies no longer being able to maintain an advantage from the unique implementation of their business process.

2.4 The relation between IT and different aspects of business performance

Business performance can be used as a measure of competitive advantage. If a company holds a competitive advantage this usually results in better business performance than their competitors.

Rai et al, (1997) have studied the relationship between IT spending and several aspects of business performance. Business performance is measured against six performance variables; (1) business output as measured by value added and (2) sales, (3) financial business performance Return on Assets (ROA) and (4) Return on Equity (ROE), (5) labor productivity and (6) administrative productivity (Rai et al, 1997).

The results of their study show that although IT can bring improvements to firm output and labor productivity, the results on business performance as a whole are less clear and might depend on other factors such as the quality of management processes and IT strategy alignment. Since these factors vary between organizations a relationship is harder to find. The definition Rai uses for IT is similar to the definition used by us. He defines IT as both hardware and software (and in some cases IS Staff). The correlation between IT spending and business performance (that can lead to competitive advantage) is, according to Rai, unlikely to be present.

Figure 1 shows a relation between IT spending and competitive advantage. According to the traditional view, increased IT spending will generate a higher business performance and therefore will lead to a better competitive advantage. Carr claims the opposite: a higher IT spending will lead to (higher expenses and) a decreased competitive advantage. Rai supports our claim by showing that there is hardly a correlation between IT spending and business performance.
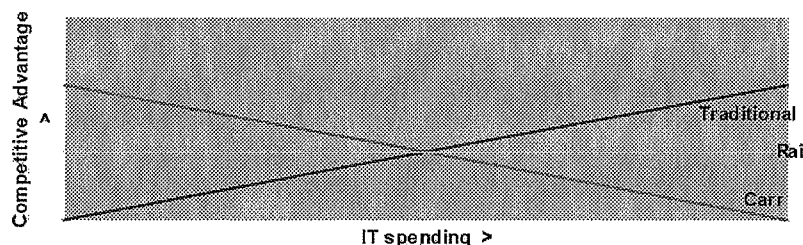

Figure 1: Relation IT-spending and Business Performance

2.5 How IT relates to other business functions

In their 1995 article Mata et al. claim the following: "IT alone cannot be a source of sustained competitive advantage, but has to be combined with other business functions." The business functions we would like to inspect are the following: Access to capital, proprietary technology, technical IT skills and managerial IT skills (Mata et al., 1995).

2.5.1 Access to capital

Businesses that use IT in most of their business functions will need access to certain amounts of capital. Investing in IT can be risky, since there is a great deal of technological and market uncertainty. Not every company is able to access sufficient amounts of capital. Therefore it has been suggested that businesses that have access to capital can gain a competitive advantages over businesses that do not have the capital requirements. However, as we have shown, the capital requirements for acquiring and using IT are declining steadily. Therefore access to capital by itself cannot be seen as a source of sustainable competitive advantage.

2.5.2 Proprietary technology

When a company has developed some form of proprietary technology one could argue that, if this technology can be held secret, it could bring a competitive advantage (Bain, 1956; Porter, 1980). However it has been shown that it is almost impossible to keep new technology secret. New technological developments often results from a combination of existing technologies. Once a creative developer has made the first implementation, it is hard to stop others from doing the same. Therefore companies that do not have this new proprietary technology are only disadvantaged for a limited amount of time. For example the company that has a disadvantage could hire the developers of the technology from whom they will acquire great insights into the technology. Because IT is becoming increasingly generic an easy to copy, proprietary technology is also unlikely to be a source of competitive advantage.

2.5.3 Technical IT skills

Capon and Glazer (1987) have defined technical IT skills as the know-how needed to build IT applications using the available technology and to operate them to make products or services. These technical IT skills are highly mobile (Mata et al., 1995). The lack of technical IT skills could pose a serious competitive disadvantage for a company. It is however becoming easier for companies that lack in-house technical IT skills to acquire these skills, for instance by employing a consultancy agency (where the notion of access to capital comes in place). Technical IT skills are highly mobile and not heterogeneously distributed across companies (Mata, 1995). Therefore technical IT skills alone will not lead to a sustainable competitive advantage. Next to having strong technical skills the IT department of a company should have thorough understanding of the business and empowered IT teams (Ross et al, 1995). By having a thorough understanding of the business the IT teams gain insights in business problem solving. Empowered IT teams are more concerned by the business needs of the employees. Communication of solutions they provide for employees is generally better. This communication helps to provide valuable feedback about the implementation of systems.

2.5.4 Managerial IT skills

The fourth attribute of IT as identified by Mata et al. is managerial IT skills. IT managerial skills provide the means to help link together the IT within various business functions. The main difference with the other attributes is that managerial IT skills cannot be easily introduced within the company. Managing is a socially complex activity. The interaction between IT managers and managers in other business functions can take years to develop adequately (Mata, 1995). A strong relationship / interaction between the IT and business units is however imperative to be able to yield the results which IT can offer. The risk and responsibility of IT usage within the

company should be shared equally between the IT staff and other business unit managers (Ross et al., 1995). The relationship that could be developed is very valuable and (commonly) heterogeneously distributed across companies. When companies adhere to the above managerial IT skills, opposed to the other attributes of IT, managerial IT skills could be a source of sustainable competitive advantage.

3 Conclusion

The discussion on the relation between IT and sustainable competitive advantage is complicated. The definition of IT as used by different authors varies, as does the definition of what constitutes business value or competitive advantage. These different definitions make comparisons between the arguments stated in different articles harder.

We have applied a narrow definition of IT as used by Carr. Additionally, we have focused on sustainable competitive advantage as a measure of IT value.

It is important to acknowledge that even if IT does not generate sustainable competitive advantage, that this does not mean there is no value at all.

The arguments we provided, the standardization of applications, the convergence on a set of best practices for entire industries, the commoditization of IT, the research by Rai et al. and the analysis of other business functions by Mata et al. and Ross et al. all indicate that IT is in essence an infrastructural technology and that it is reaching maturity and it should be managed accordingly.

IT has changed the way companies do business. The point of discussion here is whether these changes have made it easier to create and maintain a competitive advantage. We have to conclude that IT is unlikely to create sustainable competitive advantage.

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Paper 1
Review 1

Title of Manuscript: It is improbable that IT can bring sustainable competitive advantage

Which category describes this manuscript?

❑ Practice/Application/Case
❑ Study/Experience Report
❑ Research/Technology
❑ Survey/Tutorial/How-To
❑ Other (please specify): ……………..

Are the title, the abstract and the introduction appropriate? Please comment.

Title		Abstract		Introduction
❑ Yes	❑	Yes	❑	Yes
❑ No	❑	No	❑	No

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Discuss the contribution made by the manuscript:

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Rate the paper in each of the following areas (1 = low ; 4 = high):

	1	2	3	4	Explain
Technical content	❑	❑	❑	❑	……………………………
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Business content	❑	❑	❑	❑	……………………………

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	1	2	3	4	Explain
Originality of claim	☐	☐	☐	☐	....

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Statements are exaggerated		YES / NO			....

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	1	2	3	4	
Clarity and Organisation	☐	☐	☐	☐	....

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Writing style/Grammar	☐	☐	☐	☐	....

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COMMENTS ON SCIENTIFIC REASONING

Rate the paper in each of the following areas (1 = low ; 4 = high):

Claim:

	1	2	3	4	Explain
Well-formulated	☐	☐	☐	☐	....
All concepts are explained	☐	☐	☐	☐	....
Generic (1) vs. concrete (4)	☐	☐	☐	☐	....

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Reasoning:

	1	2	3	4	Explain
Well-structured	☐	☐	☐	☐	....

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Shallow (1) vs. profound	❏	❏	❏	❏	....

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Enough sound examples	❏	❏	❏	❏	....

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~~Generic (1) vs. concrete (4)~~	❏	❏	❏	❏	....

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Conclusion:

	1	2	3	4	Explain
Based on logical reasoning	❏	❏	❏	❏	....

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Contains new elements (1=yes, 4=no)	❏	❏	❏	❏	....

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Does the manuscript contain sufficient and appropriate references? Please comment.

	NO			YES	Explain
Sufficient references	❏	❏	❏	❏	....

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References in conference style	❏	❏	❏	❏	....

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References where appropriate	❏	❏	❏	❏	....

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Suggestions for improvement to the paper:

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Paper 2

RFID & Consumer Purchasing Behaviour: Intrusion of Privacy Rights

Abstract

Although Radio Frequency Identification (RFID) technology has been around since 1980's, it is not until recently that RFID is used in commercial areas. RFID has the capability of improving the process of supply chain management and retailing while it remains to be major concerns among consumers at large. This paper addresses the capability of RFID technology in collecting data in which consumers' privacy rights might be intruded during, after and before the purchasing process takes place. Most concerns regarding RFID technology are related to its capability to surreptitiously collect and stores information.

Introduction

Many consumers who use debit and credit cards to purchase goods and services realise that the act of swiping such a card may transmit information about their identity and their purchase to their bank. At this point, consumers possess controls over their personal information in choosing whether or not to get such a card, from which company, under which term of service, when and where to use the card, how to store them and to destroy the card [1, 3, 7]. Thus they have control in when and where to hand over their personal information to other party. What consumers are less likely to be aware of are the existence and the deployment of Radio Frequency Identification (RFID) tags [3, 7] where it is possible to transmit consumers' personal information secretly. This can be caused by unfamiliarity of the technology, or the invisibility of the RFID tags attached in the products.

The RFID technology uses radio waves to automatically identify an item based on a unique identification code which is linked to that item[1]. This can be done using RFID tags. This technology has been around for decades, initially used for proximity access control in the military environment [7]. RFID tags have evolved over the years to be used in supply chain management, retail and medical application etc. For example RFID tags are used in a library for book tracking, airline baggage tracking, and apparel item tracking. RFID tags are also being used for surveillance and monitoring consumers' behaviour [4, 8].

An RFID system has three integral parts: a tag, a reader and a database. RFID tags contain silicon chips and antennas to enable them to receive and respond to radio-frequency queries from an RFID transceiver (reader). The database stores the information that link the unique ID with other data of interests such as product name. Without the antenna an RFID tag is about half of a grain of sand [5], therefore it is very difficult to be recognized with naked eyes. Tags are classified as active if they have a battery power source. Passive RFID tags receive their energy from a remote RFID reader. Passive tags are cheaper and more commonly used in commercial applications.
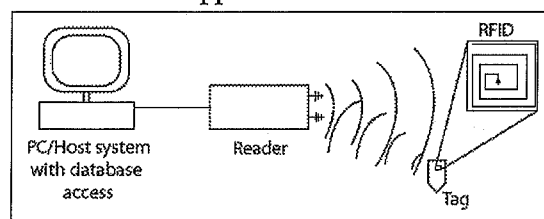
Fig. 1 RFID system [7]

The ability of RFID technology comprises of secretly collects and then stores a variety of data all related to the same person, tracks individuals as they walk in public places (airports, train stations, stores), enhances profiles through the monitoring of consumer behaviour in stores, read the details of clothes and accessories worn and medicines carried by consumers [1, 2, 3, 6, 8]. This has become the main concerns for the majority of consumers. These behaviours jeopardize the consumer privacy rights by

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[1] http://en.wikipedia.org/wiki/RFID

eliminating or reducing the consumer's anonymity. It is unclear for the consumers what information is on the tag, what has been added, how to check that information, has any data been retained; if so by whom, when and where etc. Although the information in the tags might seem useless for consumers, it is still owned by consumers. The data in the RFID tags cannot be controlled by them. Furthermore, there are no standard regulations at present to control and to manage the implementation of RFID tags in commercial industries. The undefined regulations do not benefit the consumer.

This paper addresses the issue to what extend the implementation of RFID tags intrude or endanger the informational and physical privacy rights of the consumer that purchase, possess, or carry the product attached with RFID tags. Section 2 will explain the definition of privacy rights, and set the boundary of which privacy rights aimed in this paper. Section 3 will further explain the areas and situation where intrusion of privacy rights happens. Finally conclusion will be drawn in section 4 followed by recommendations on how to mitigate the risk of implementing RFID tags in the commercial use.

Informational and physical privacy rights

The term "consumer privacy right" can be defined as follows: 1)The right to be left alone that varies according to the context and environment [1], 2)Consumer privacy as a joint right and duty [4], where the emphasis is laid on the access, property and control of personal data, and the still developing autonomy between the consumers and the data collectors, 3) The four aspects of privacy rights informational, bodily, communicational and territorial (physical) privacy rights [1, 3].

Informational privacy rights focuses on the right of an individual to retain control over the collection and use of personally identifiable information. In the digital era, personal data is easier to track and available through public resources. With the roll out of RFID the retailers become the "mother lode of... data collection for commercial enterprises" [3]. Intrusion of informational privacy rights happens when the data is collected without the consumer's knowledge or consent. Lack of consumer's control of when and where data collection processes take place and misuse of information stored in databases can be categorised as intrusions of informational privacy rights.

Physical privacy rights refer to the ability to track physical movements of consumers as far as prevailing technology permits. Using RFID tags, personal data can be collected through tracking devices in the physical world. This can be categorised as an intrusion of physical privacy rights.

How RFID intrudes consumer privacy rights

Lack of transparency

With the help of RFID tags, retailers are capable to combine personal information and purchasing information of the consumer to build complex consumer database in no time. But the use of RFID tags in profiling consumers' behaviour raises ethical concerns because the lack of transparency in the process of data collection and use. The lack of transparency happens in the activities such as when retailers constantly observing/processing/evaluating consumers behaviour (setup profiling). Through collection of lifetime span purchase history of the consumer, retailers are capable of making inferential assumptions (e.g. habits, lifestyle, and health) and then conducting target marketing. In performing the data collection through setup profiling activities, retailers do not adequately inform and educate consumers which lead to the lack of transparency in data collection process.

Limited control of personal information privacy by the consumer

RFID tags are seen as better replacement of barcode technology. By using RFID tags retailers are able to uniquely identify each item bought by consumers. They enable retailer to monitor a consumer and build detailed consumer profiles accordingly even when a consumer does not make a purchase but only walking around the store with a tag attached in a product in his/her possession. In this scenario the consumer has no choice. The retailers can build a complex database about a consumer without the

consumer being aware of it. Additionally, the consumer may not aware that the products purchased are embedded with RFID tags and it remains functional even after the products are taken home. This creates the possibility for surveillance and other different purposes which are not related to the management of supply chain and inventory. In this situation the privacy of the consumer is violated in terms of the unawareness about any surveillance of their behaviour. Also in the case when the consumer leaves the shop, he/she will be scanned at the next shop as soon as they enter the shop. It means reading consumer data without the consent from that consumer (discovering their earlier purchasing behaviour). This gives retailers the possibility to identify and track random consumers. If customers give information voluntarily and are informed about how this is going to be used, their privacy will not be violated.

In the scenario of Albert Heijn[2] bonus card that uses barcode, the consumer is well informed about the information that is gathered around and from him/her. The scanning of the card requires close physical contact (using scanner at cashiers). This method gives the consumer a choice whether to give or not to give away information, while the RFID tags utilisation does not.

Based on the above scenarios, we can see how the consumer losses their control over their personal information when RFID tags are in use. In the first scenario consumers' information is merged with several other databases owned by companies other than the one consumer doing business with, therefore the consumer loses control over how the information is being used [2]. It also limits the consumer in controlling their personal information [1, 2, 3]. The consumer is not aware of any data collection process about his/her purchasing behaviour or personal information and is not informed about the purpose of data collection.

Regulations and trust dependency

Currently there is no absolute means to guarantee that there will be no abuse in 1) information contained in the tags, 2) method of obtaining the information using RFID tags. There is no clear regulation and technology standard that regulate the use of RFID tags. Regulations vary in each country and in each field of implementation [4, 6]. There are guidelines available provided by Data Protection Act [6] such as: 1) Consumers should be notified when RFID tags are present in what they're buying; 2) RFID tags should be disabled by default at the checkout counter; 3) RFID tags should be placed on the product's packaging instead of on the product when possible; and 4) RFID tags should be readily visible and easily removable [1 ,2 ,6]. But this is only comes down to the trust, whether consumers believe that the tag is actually being handled according to the guidelines as the retailer/government agency says it is. Should the consumer only believe what the stores or government says that it is so?

Furthermore, there is no standard in term of deactivation of the tag and encryptions of personal data stored in the chips memory [3, 5, 6]. Apart from technical standards defined by ISO [6], there is a lack of regulations in the "how's" of implementing RFID technology. The safety measures of protecting privacy of the consumer merely depend on trust between consumers and retailers or government. Hence there is no absolute means to protect the consumer physical and informational privacy.

The information of consumer's physical whereabouts (traceability and tracing issues)

The RFID technology gives information about the location and status of things [10]. The OV-chip card[3], which is based on the RFID tags, will be able to track individuals in term of physical movements. The transportation organisation will be able to collect information from individuals to the details of where, when, specific route, and how often they travel by reading the signal from the tags. Equipped with proper tags reader and data mining techniques it would be possible for party other than transportation organisation to trace a traveler's whereabouts. RFID tags of themselves may not raise traceability issues, but combined with data mining techniques and a reader (which is not difficult to obtain), they have the potential to gather and retain physical whereabouts and other information of an

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[2] Albert Heijn is one of the biggest supermarket franchise in the Netherlands (http://www.ah.nl)

[3] http://www.ov-chipkaart.nl

individual with tagged item on them [5]. This may lead to both informational and physical privacy intrusions.

Conclusion

The collection, usage and storage of consumer data using RFID technology intrude the consumer privacy rights, this happens when:

- The RFID tags are attached or embedded in products without the knowledge of the consumer who purchased those products. The RFID tags can also be scanned without the knowledge of the people that carries them. This may lead to the intrusion of informational privacy rights.
- It is unclear what will happen to the information that has been collected (lack of transparency). Collectors should take responsibilities such as notifying consumers about data collection process, guarantee an authorized RFID tags use, offer consumers options about when, where and how information is collected and gives access to view data collected about them.
- The tags can be used to physically track the individuals that purchased the item. Without transparencies, adequate controls and pertinent regulations, the implementation of RFID technology may obstruct the privilege of privacy among consumers.

Therefore careful precautions should be taken to prevent an abuse of RFID technology that leads to consumer's privacy violation. The implementation of the RFID tags should be made as explicit as possible so that the "when, where and how "of the data collection process is publicly known.

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[9] ITU Internet Reports: "The Internet of Things Edition" 2005

Student name:	
Student number:	

Review 2

Title of Manuscript: RFID & Consumer Purchasing Behaviour: Intrusion of Privacy Rights

Which category describes this manuscript?

❑ Practice/Application/Case
❑ Study/Experience Report
❑ Research/Technology
❑ Survey/Tutorial/How-To
❑ Other (please specify): ....

Are the title, the abstract and the introduction appropriate? Please comment.

Title		Abstract		Introduction
❑ Yes	❑	Yes	❑	Yes
❑ No	❑	No	❑	No

Explain:..
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Discuss the contribution made by the manuscript:

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Rate the paper in each of the following areas (1 = low ; 4 = high):

	1	2	3	4	Explain
Technical content	❑	❑	❑	❑	....

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| Business content | ❑ | ❑ | ❑ | ❑ | .... |

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Originality of claim	❑	❑	❑	❑	....

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Statements are exaggerated   YES / NO   ....

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Clarity and Organisation	❑	❑	❑	❑	....

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	1	2	3	4	Explain
Writing style/Grammar	❑	❑	❑	❑	....

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COMMENTS ON SCIENTIFIC REASONING

Rate the paper in each of the following areas (1 = low ; 4 = high):

Claim:

	1	2	3	4	Explain
Well-formulated	❑	❑	❑	❑	....

....

	1	2	3	4	
All concepts are explained	❑	❑	❑	❑	....

....

	1	2	3	4	
Generic (1) vs. concrete (4)	❑	❑	❑	❑	....

....
....
....

Reasoning:

	1	2	3	4	Explain
Well-structured	❑	❑	❑	❑	....

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....
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Student name:					
Student number:					

	1	2	3	4	Explain
Shallow (1) vs. profound	❏	❏	❏	❏	....

....
....

	1	2	3	4	Explain
Enough sound examples	❏	❏	❏	❏	....

....
....

	1	2	3	4	Explain
~~Generic (1) vs. concrete (4)~~	~~❏~~	~~❏~~	~~❏~~	~~❏~~	....

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....
....

Conclusion:

	1	2	3	4	Explain
Based on logical reasoning	❏	❏	❏	❏	....

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....

	1	2	3	4	Explain
Contains new elements (1=yes, 4=no)	❏	❏	❏	❏	....

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Does the manuscript contain sufficient and appropriate references? Please comment.

	NO			YES	Explain
Sufficient references	❏	❏	❏	❏	....

....

	NO			YES	Explain
References in conference style	❏	❏	❏	❏	....

....

	NO			YES	Explain
References where appropriate	❏	❏	❏	❏	....

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Suggestions for improvement to the paper:
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