UPC and the Information of the Third Kind

Michel Plaisent, Prosper Bernard, and Sopit Norpanya

***Abstract*—**This paper aims to study the impact of UPC technology in the context of the grocery consumption in order to identify the advantages and disadvantages for retailers and consumers. In a second step, we will study the impact of education on the use and format to consider thirdly, a computer alternative to the status quo: the implementation and operation of a database able to act as an invisible hand dedicated to the protection of consumer interests. For this third way we will evaluate its technical, economic and political dimensions concerns.

***Keywords*—**UPC, consumer information system, cost of information, social acceptance of technology.

I. Introduction

INTRODUCED in 1974 in a in a Marsh supermarket in Ohio (Smithsonian, 2015), the Universal Product Code (UPC) introduction at grocery began a revolution in the food distribution industry (Assembly Office of Research, 1977). It was then described by Moyer (1975) as "One of the most momentus marketing innovations", a disruptive approach to point-of-sales. But innovation is a messy business without strategy to guide it (Sattle, 2013), namely as any technological innovation, the UPC was to confront the social partners in the pursuit of economic, disrupt the habits and induce new behaviors like more recently UBER taxi dynamic pricing (Surowiecki,2014).

Justified in the eyes of the industry, wholesalers and retailers by the savings it allows, at a time when inflation control new rationalizations, scanners rendered redundant the costly individual product labeling. Even nowadays , the objectives are still the same: increase efficiencies and improve customer satisfaction (Teklynx, 2015) .

Meanwhile, consumers perceived the abandonment of the individual product pricing practice as an injury to the exercise of their right to information, namely to basic prices (Kenning et al, 2007; Forget, 1976). Consumers has been shown to have four main factors to price knowledge: accuracy, confidence, usability and specificity (Bahl et all, 2011). But a recent study showed that almost 50% of purchases are done by consumers using lower price expectations than real price (Murthi & Rah, 2012). The controversy over price marking, found many echoes both in the media and in academic journals, raised many government and private studies, and even inspired law in response to consumer pressure. Indeed, social concern assumes that IT development can match the needs of the social groups it is supposed to serve, namely by the addition of functions specifically designed for this purpose (Ardouin et al., 1977). Indeed, to challenge competition, todays companies must innovate and focus on consumer needs (Marketingschool, 2014).

There is agreement for the need of timely and relevant information in the context of consumption, any consideration kept for congestion and format, in non-perfect consumer markets unless the delivery of consumer information is made more effective (Kenning et al, 2007; Maynes et al., 1977; Ponton, 1980). This need could be satisfied by the secondary function of the UPC technology: the establishment of an information system to the consumer).

II. Main Impacts Of Upc Technology

The introduction of scanners in grocery stores has caused a controversy on compulsory stamping, fed by the conflicting interests of the main protagonists is the food industry. This section is intended to recall the position of the main ones.

Food producers and wholesalers

Initiating their own end of this technological progress, these groups have invested to develop the PCU. The widespread use of the player is required to them as a sine qua non for its business. It includes, according to Matter (1977):

- elimination of losses due to errors and fraud in the processing of purchase orders;
- substantial improvement of their information system on the movement of products on consumer behavior, faster and accurate feedback on any promotion experience;
- an effective and safe way to collect and analyze data.

Retailers point of view

Benefits to the merchant are of two types (Berman, 1979):

- tangible (hard saving), consisting of the sum of savings such as: increased productivity at checkout (.4% of sales), reduced errors, intentional or not (.8% of sales); the elimination of price marking allows additional savings .4%
- intangible (soft saving) - for the merchant, among which include: an optimized inventory management, better use of space in store and a better measure marketing policies.

Michel Plaisent, dept Management and Technology, University of Quebec in Montreal Canada, michel.plaisent@uqam.ca

Prosper Bernard, dept Management and Technology, University of Quebec in Montreal Canada, prosper1941@yahoo.com

Sopit Norpanya, Rajamangala University of Technology Isan, kate_s19832@hotmail.com

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• consumer benefits (according to the industry) : the accuracy of the records, the acceleration of the service of cashier and a receipt more detailed advantageously replacing individual stamp.

Consumers associations

Consumers are less daunting to the optical drive as the abolition of individual marking of prices on products. Various studies have been conducted to determine consumer attitudes to non-marking (Gylling, 1976; Langrehr et al., 1979) and their behavior in the situation. Indeed consumers appreciate the benefits reported by retailers. The omission of weights and capacities may explain the limited use applications as the comparisons and longitudinal studies (OMC, 1980) are impossible. The disadvantages attributed to the UPC technology included the possibility of failures (OMC), the vagueness and delays (OMC, OPC), a certain distrust of computers (OMC).

According to the OMC survey, 87.9% of consumers say they are opposed to the non-marking of prices; 91% of users are opposed to conventional stores (OPC, 1981) and 78% of users in general (OPC). Related to this importance of individual stamping, following reasons were previously cited in a study from the University of Michigan, later confirmed by OPC and OMC:

- loss of consciousness prices;
- identification of the most difficult in the purchase price;
- tend to do less shopping comparisons;
- prolonged duration of the shopping required time

Distrust of the consumers to the merchant generates other fears:

- more frequent price increases;
- economies not transmitted to the consumer;
- poor synchronization between the prices on the shelf and in the computer's memory;
- old products sold at the new price

It should be noted that an induced tolerance appears, due to familiarity and time. Resistance is less intense, as some less pronounced fears. In order to reduce the resistance of consumers , the Retail Council of Canada (2105) adopted a voluntary Code of Conduct, endorsed by the Competition Bureau, which covers all aspects of the UPC, namely the provision that when a scanner price error occurs, the cashier will be authorized to implement the Item Free Scanner Policy.

Finally, some studies have shown that consumers, unlike their associations, attach little importance to price and cash system (OMC).

III. Information As A Consumer Problem And Resource

The enlargement of the range of products available, coupled with refinement in multiple models and brands, as well as the increasing complexity of their composition may lead to less-informed consumer decisions, unless this one has more efficient market information (Maynes et al., 1977). The main problem of the consumer is to be overwhelmed with a flood of data and yet sorely be missing information. Of course, decision-making requires information. The information is all the more necessary to consumers as reducing barriers to information results in a significant increase in the competition (Baldigo et al., 1980).

Indeed, according to Goldman and Johansson (1978), the economic theory claims that:

- consumers will seek as long as their marginal gains exceed the marginal costs associated with this activity;
- the intensity of this search would be, ceteris paribus, proportional to the expected gains;
- the greater the dispersion of product prices in the market, the larger the expected savings expected from a search;
- The lower the marginal cost of search, the greater the number of searches needed.

Maurizi (1972) conclude from the previous statements that lowering the cost of search would have an impact on lower average market price and as smaller dispersion of prices, which is therefore a gain for the consumer (Baldigo et al., 1980). The existence of this surprising little dispersion in a market characterized by an important bias: here is much more research on what the retailers want the consumers to know than on what he should know or want to know (Engledow et al., 1979). However, there has been in recent years a growing maturation of consumerism, which reflects the fact that consumers are now more conscious of the necessity to search for information and find the most appropriate sources of (Engledow et al., 1979)

Some examples from the literature will be used to illustrate the impact of information and its form on the price of products. Recognizing the legitimacy of an extra price for smaller quantity of a given product in particular to promote sparingly in times of shortage and promote responsible consumption, Widrick (1979) is surprised that it is found in 33.8% of marks groceries. According to him, it is not acceptable because unconditionally this is not an optimal and responsible use of natural resources; indeed, it takes more energy and material to produce two containers of one liter than a two liter container. An explicit conduct research to assess the impact of unit prices, moreover, claimed an average savings of up to 3% when they are available to consumers in the form of comparative lists.

Devine (1976) confirmed this result with an experiment for groceries in the Ottawa-Hull region; its conclusions on the impact of information are to the effect that:

- it reduces the dispersion of inter-store price;
- it reduces the intra-store variability;

• it decreases the average price level in the market of 7%.

According to Maynes et al. (1977), the publication of comparative information should have the effect of lowering the market price to the level they would have perfect information in context; for them, the interest of a consumer information system would precisely be the consequence of to the systematic undervaluation by consumers in the current price dispersion in the market. Other subsequent studies tend to confirm these findings (AAPA, 1977; Hawkins et al., 1972) even though the problem does not appear related to the volume of information which could on the contrary become an information overload problem (Geistfeld, 1977). Yet Haines (1972) also mentions the lack of processing performed by the consumer. The information may be useless even to the extent that the purchasing process when they occur, tend to be rather routine rather than sophisticated, based on very few criteria, few alternatives (Olshav et al., 1979).

It is interesting to note that social class would be a cleavage factor as lower income consumers and less educated usually prefer less information or get confused by more information (McCullough et al., 1980). At the other end of the spectrum, information overload defined as more than human capacity to process information would have negative effects of effectiveness , accuracy and precision (Jacoby, 1977). An other dimension of information overload concerns the fact that public does not always understand the wide variety of information provided (Friedman, 1977).

This limit to understanding in addition to the above mentioned trend leads to the conclusion that shopping mode is as important as the fact to shop (Hawkins and McCain, 1979). The implications of the use of unit prices seem very fruitful in this regard. It thus appears that to be useful, information must be presented in an understandable form, its availability and its simplicity (Scammon, 1977).

Furthermore, in the context of sharing the benefits of technology, it seems appropriate that the computer does not only serve to the seller to know the buyer's behavior but also the consumer. This is where Information technology can provides its power. The next section will describe the potential use of data bases and website to support consumers.

IV. Information In An Alternate Mode: A Consumer Information System

A. Description of CIS

The Universal Product Code has forced the time invariant codification of all uniquely groceries for all the shops. First, this consolidation enables the unique identification of each product and allows therefore automatic or electronic comparisons. Second, each store equipped with the appropriate technology will keep for his own use, in an electronic format, an updated list and detailed information on all its products. This format has the advantage of making possible the transmission to a central bank of all data accurately, fast and very economical. These two features are precisely the very infrastructure of a computer aided Consumer Information System (CIS), , following the project of Berman (1979; they facilitate the collection and centralization of data so already and already technically feasible and economically viable. The database thus constituted can be exploited by computer to provide consumers the information they need in the form that suits him. This prevents overexposure previously identified problems. The interface can take the form of a Website with general features (the global database) and personalized features (the specific information and common queries from individual users). The data is to be fed either thru an agreement between retailers and Consumers associations or either by the retailers themselves as a service to their customers who want to prepare their shopping list. The website would be maintained under the Consumers association responsibility at a very low price. As a first step, an implementation for some 25% of products representing 80% of the volume of products sold in grocery stores could reveal sufficient

B. Impacts of CIS

Because the computer has considerable processing capabilities, several analyzes previously performed by a small number of consumers may be available to the majority; new type of analysis would also be possible, or general (on request) specific to the needs of a particular consumer; summary could be published in the morning papers. Several analyzes are clearly attractive to consumers, namely:

• analysis by product class and size to order the products in order of unit profitability;

• quality / price ratio, provided that consumers agree to define a quality index;

• analysis of the nutritional quality of trademark provided that such information has been codified by accredited consumer groups;

• comparison between stores chains or merchant to identify the cheapest for a typical shopping or for a specific basket;

• longitudinal studies to identify the long-term the most satisfying dealer about the evolution of prices by food category;

• assistance in the preparation of the food budget by simulations;

• preparation of a shopping list.

Many other usages could be drawn by the consumer from the existence of such a CIS. But a side effect may have been leave unnoticed, which can be called «the invisible hand of the market», a term created by Adam Smith in 1776 (Investopedia, 20014). The fact of the existence of a near-perfect information in the memory of the computer, regardless of its use by consumers, will have an effect on the market. Economic theory suggests indeed that it will result in

a decrease in the average cost of the food basket, dispersion and variability of prices. The advantage of the system is that its existence will be beneficial to all consumers without forcing them to use, which meets in our view to the previously identified concerns. It would not force consumers to run from store to store to find the most economical products.

C. Economic Feasibility

A theoretical study of Vancouver market by Devine (1978) showed that such a system is economically feasible. The latter has indeed shown that implementation costs and operation of such a system would be largely covered by several savings by various organizations such as:

- consumer associations as part of its analysis of the market;
- supermarkets to develop their competitive pricing strategy;
- government and private agencies dedicated to the monitoring of prices and data (per example Statistics Canada, Statistics Canada, price monitoring agency, Conference Board, etc.)

V. Conclusion

Considering firstly the inertia of the status quo, and the frequent distrust toward computers, it is not surprising the likely reluctance of consumers facing this new medium, this new design information requiring to learning them to obtain information presented in a new format.

Meanwhile, we can also expect from supermarket managers to be reluctant to a tool which can favor liberalization of information, and thus lower the prices, increased competition and decrease their power over the consumer. No doubt that for certain types of products (eg canned and soaps, etc.) both parties could find advantages in the execution of electronically market even book shopping store more perishable products.

We presented in these lines a minimum version of SIC in that it is restricted to groceries. It should be noted that this system could be the embryo chosen because of practical considerations of a larger system that includes all consumer products. For groceries, we put the emphasis on price, although it is obvious that other types of data can be incorporated into the database (eg, nutritional value, food content, etc.)

It should be stressed here that we deliberately failed to address the problems related to the management, financing, development control and operation of such a system. Note, however, it appears to us essential that consumers and their associations are involved thoroughly and, now as both designers and developers of the system to be usable experience for other types of products may include the consumer database.

Our study allowed us to identify certain lines of research that we consider promising.

This mini-base would be an excellent promotional tool of a SIC in that it would allow everyone to grasp more easily the operational capacity of a system provided that a suitable language is used. This approach would be more appropriate to unfamiliar requirements and possibilities of computers.

In addition, this mini-bank, allow the media to verify the conclusions regarding the economic impact of information on price levels and dispersal. In this regard, it would be important to clarify whether the distance can affect the magnitude of the effect of information. It should be examined whether, through information, this grouping of prices around the mean is always accompanied by a decrease in the average level, or whether, behavior type "cartel" tend to grow.

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