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Analysis of the cost impact of the new technologies in e-tail

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Abstract: *The impact of new technologies on retail is studied in terms of costs. Starting from the idea that reducing costs should have a significant effect of the new technologies in retail, it is investigated the possibility that it actually constitutes the basis of a new facette of the cost leadership generic strategy. Exploratory research tracks some automation effects on transaction costs and labour costs in retail. General business models in the field are analysed, with a focus on some concrete ways of implementation in retail, particularly as e-tail. In the background we grasp and discuss the aspects of the financial flows related to trade. Even when those issues may prevail, one cannot elude discussing the cultural and ethical standards associated to the trade new features induced by e-tail and the new technologies.*

Key-words: *E-tail, new technologies, business models, cost leadership, pricing.*

1. Introduction to the real new world of retail

It seems obvious that the ultimate metric, in any commercial activity, is the profit. Many definitions, approaches and statements that elude this simple truth were put up front over the time – such as society benefit and welfare, environment care, social responsibility and so on, but the ultimate expression of success remains, for a company, the profit as a simple equation that involves Revenue and Expenses (as in costs and taxes).

It is the same old balance that drives the company's efforts and resources towards achieving a positive financial flow after reimbursing all the factors that intercede in the process. It works for all kind of activities, but for the retailer area, with its often narrow margins, it seems to be even more challenging.

The retailer will obviously work steadily at increasing its revenues and at reducing its costs. On the income side, unless new and revolutionary products are brought to market, we consider the revenues as being approximately inelastic, at least in the short term (on the hypothesis that the venue is fixed, the market positioning is relatively stationary, and the prices cannot be increased suddenly).

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The most important costs for a retailer are the cost of the merchandise itself, the cost of labour, management overhead, and transaction costs. Technology push can be proven helpful in all the items above, in various proportions, maybe less of course when it comes to taxes. Of all the area cited, the labour costs seem the most sensitive to technological positive inputs, as more prone to improvement in terms of reducing costs overall, due to automation hence less physical presence and involvement of the employee in the business processes. That would materialize in a reduction of direct labour costs, as well as transaction costs. Other costs should follow the same logic of the cost per unit reduction, associated to the sales growth, leading to a scale effect brought by the new technologies. It is why this type of retail expansion is supposed to be based more on achieving a low cost than on differentiation in respect of Porter's terminology.

Summarizing these considerations it can be established that e-tail and new technologies appear to be a viable source to sustain growth in sales volume since it can entrench the reduction of transaction costs (Williamson, 1985). For the seller, these costs are weighed along with operating and system implementation costs. For the buyer, the transaction costs enter into a subjective balance in association with the emotional side that accompany the act of the purchase.

2. Approach and considerations on costs in retail. Literature review

The reduction of the operating costs is one of the main advantages offered by e-commerce for retailers, besides the optimization of the supply process and inventory management, the improvement of marketing activity and the opportunity of expansion on international market (Bărbulescu Şeitan, Gherman and Bulgărea 2010).

Cost reduction in the retail based on new technologies is made possible by the standardization of products and/ or the standardization of the purchase act. The first category includes books (e.g. Barnersandnobles.com) and some clusters of electronic products. In the second category there are groups of services - significant through volume of sales - such as touristic services (e.g. Expedia.com) or financial services. Standardization increases the bargaining power of the customers and the new technologies provide more information that leads to lower search costs (Porter, 2001). Directly and indirectly, the existence of more information increases the price competition among the sellers, as observed by Bakos (1998) for electronic products.

For example, the study of a start-up e-tail depicts a number of cost advantages that arise from the beginning due to the creation of a different value chain than for offline retailers.

Various researches related to the impact of new technologies onto retail are accompanied by statistics on the industry evolution in recent years. In countries with developed statistical systems there is data that permits settling an image on the evolution of different segments of e-commerce, including new technologies impact

on retail. As in many other areas of management, the US statistics show significant trends. The mentioned data must be correlated with studies focused on some particular issues of e-tail and the impact of new technologies on retail. Even though these studies are mostly related to the US economic area, they have the same guiding value as the mentioned statistics.

Laudon and Traver (2014) underlined that the US retail market is estimated in 2013 at about $ 3,900 billion. Since any user of modern devices, such as tablets or smartphones connected to internet is a potential customer, there is a significant growth area. From the afore mentioned amount, it is believed that about $1,300 billion represents trade "influenced by the internet", and from the latter, Business to Customer (B2C) e-commerce would be approximately $420 billion, that is 11% of total retail. Data on revenues associated directly or indirectly to the American e-tail can be pooled with the ones regarding the expansion of devices linked to internet. Such devices generate the "demand" for e-tail and in fact engender a new development of the internet infrastructure. They include tablets, smartphones, light laptops and mobile platforms associated with so-called mobile e-commerce (or m-commerce), part of which is the e-tail (Khansa, Zobel and Goicochea, 2012). The estimate is that in 2013 the US population holds 363 million mobile devices, while the prospect is of 400 million in 2017. On the same page, mobile e-commerce exceeded 40 billion in 2013, but it is to be observed that, even if the amount seems slight, it has actually doubled as compared to 2012.

Finally it is to be emphasised that e-tail is marked, as e–commerce is, by the same thorny issues related to ethics, political and social facets. Given its expression that is more "tangible" for this form of e-commerce, these issues enhance behavioural aspects of the participants to the sequence, especially consumers. More specifically it is likely that relational characteristics between consumer and retailer, as well as the social ones, associated to the purchasing act counterbalance the purely economic aspects related to price, for example.

In terms of research methodology is noteworthy that the afore mentioned aspects are studied in most cases by conducting online surveys, using the same tools put in place by the new technologies associated with the internet. In essence, the e-tail related to corporal goods and some categories of services, as well as the use of new devices in transactions generates difficulties related to the use of intermediaries for the actual delivery, as well as for maintaining the consumer's confidence in this system.

The actual transfer of property from the seller to the buyer generates a distinct cost. Its management is part of the retailer's strategy (Frischmann, Hinz and Skiera, 2012), in such way that the "gross price" paid by the consumer (that is the sum of the net price and the distribution costs) has to appear to the latter as affordable as possible. In addition, the e-tailer exploits the so-called zero-risk bias. Thus the customer's satisfaction associated with such transactions translates into loyalty and confidence in the online environment and consequently into the e-tail company. In

such way, the retailer's efforts aiming to "recover" a customer after a complaint about delivery for example, will improve the perception of the relationship between costumer and e-tailer (Pizzuti and Fernandes, 2010).

Henceforth, some of the cost reduction induced by new technologies is partially offset by the existence of logistic costs related to delivery. Also, the management of the relationship with a customer that has been affected by distrust in the system prompts out additional costs.

It should also be noted that offline/classic retail is in itself a form of behavioural expression and socialization. This is studied by psychologists and sociologists interested in the syndrome of shopping mania. The e-tail strategists could be interested by this syndrome only to an extent: that social networks such as Twitter or Facebook and, more generally, social e-commerce does not completely replace the need for networking with other buyers and the pleasure of choosing and buying. Ono, et al. (2012) shows the existence of a distinct motivation to browse the classic stores, linked to the satisfaction of direct purchase. Changing this engrained behavioural expression brings up again additional costs to the seller, but also to the consumer.

This study is empirical, based on a qualitative approach and analysis of the main aspects related to the costs evolution under the impact of the new forms of retail. Cost-generating elements are considered, as well as their reflection onto the specific behaviour induced to consumers.

Studying some business models that arise from immediate reality is focused on key issues such as cost evolution and the influence of various factors (as in IT tools utilization and associated behavioural aspects) on the asking prices and costs. The latter are studied in terms of economic sustainability of a real business that operates using these models. Attention was focused on emblematic cases, either of positive or negative nature.

The study of generic examples of business models and companies that use them require the employment of a case study methodology. This approach is made in terms of the theoretical guidelines given by Yin (2003) for this research tool.

3. Outputs of automation processes in cutting retail's transaction costs

It is well known that retailing is generally a labour intensive activity thus any reduction in its cost is poised to significantly influence the bottom line. Basically stated, its replacement with capital cost is the main use of technology ever since the first market was invented.

It is a simple as that and there are metrics in place determining to which point the cost of the automation of a process is worth in terms of replacing or at least reducing the human labour and its associated costs. The golden rule is that the cost of acquisition of the machine replacing one employee has to be less or equal to the

annual salary of the employee being replaced, all benefits included. We cannot of course objectively quantify, nor predict the hazard related to the employee's attendance, such as sick leave, temporary work incapacity, maternity or simply lack of productivity. Technology seems ready to take over these risks and provide continuous and faultless "service" by automating processes and even out the businesses baseline in a given industry. Is it then interesting to see on which other features the competition shall be driven on. This issue will be addressed in a separate section.

Introducing the concept of retail "self-service technologies" (SST) consists in the use of information and communications technologies to substitute the human labour. The customers themselves play then the role of service employees with the support of new information systems and electronic tools. The business processes change from one where the retailer serves all customers to one where the customers serve themselves (Meuter, Ostrom, Roundtree and Bitner, 2000).

Such technological advances are already mainstreamed in: radio tagging of merchandise, autonomous units for shelving, high speed scanners both optical and radio based, automated shelf stocking, automated inventory tracking, smart vending machines for goods that are standardized, small enough, and which do not need individual examination, automated delivery services with less people needed, alternative payments methods (pay by bonk, google wallet, apple pay, PayPal check-out, Near Field Communication enabled credit cards (NFC), and of course automated check-out points and self-checkouts. The checkout stations will ask the customers to scan the barcodes of their products, make the payment and pack the merchandise without any intervention of service employees (Schliewe and Pezoldt, 2010).

Self-service technologies bear an acceptancy rate among customers, depending on cultural dimension of the economic area that they are introduced to. Lim, et al. (2004) show that individualism and uncertainty avoidance are important to consumers' acceptance of innovations in different cultures. Thus, the Asian cultures have a significantly higher inclination towards new technologies in retail as compared to the more conservative European countries. The lack of "human touch" as part of the trading process seems to be an issue in the "old European" space, while the over technologized South Korea, Japan or (recently) China embrace relentlessly technological changes in retail and integrate them into new business models.

According to Kelly, Lawlor, and Mulvey (2010) there are 29 different self-service factors that influence the adoption of SSTs. Among them, the personal characteristics have been identified as significant psychological determinants for the technology reception. These characteristics include mainly social pressure, estimated self-efficacy and technology anxiety (Eastin, 2002; Mulaomerovic and Trappey, 2013; Schliewe and Pezoldt, 2010). Societies that are culturally more inclined towards individualism, and presenting a high degree of uncertainty avoidance (directly linked to estimated self-efficacy and technology anxiety) will have a lower rate of acceptance of the new technologies in retail.

Another significant transaction cost is related to the price discovery. How to determine the price of a new item offered for sale? The retailer is basing it on the cost of the raw materials or merchandise and of the labour involved. For more sophisticated ones, the equipment depreciation is to be factored it. In addition, a "fair" margin shall be added. The opportunity and replacement costs will not figure somewhere in the ledger, but should be taken into consideration as well.

In reality, the market might not bear a specific price. The task of the retailer is to rapidly find out what the accepted price is and then adjust closely to it. If the market sentiment changes then the asking price should adapt immediately so that no order will be discouraged.

It is considered that the best way to determine a price is by the auction mechanism. For some items, the auction might be impractical and it is difficult to draw the line.

Another mechanism will be needed then to determine what the clientele prefers. It is where technology intervenes again and can support the heightened price volatility easily enough with automated inventory tools and electronics tags for example. The real limit is then imposed by the retailing rules which are outside of scope.

In such conditions, the retailer should be making the list price as a cluster of mere suggestions allowing the clients to offer whatever they prefer. In a liquid market it should not take long to find out the accurate price for everything. "Accurate" means in this instance the price for which the market clears i.e. everything gets sold. The example of eBay comes to mind. The other online retail formulas run however on fixed and announced prices, but with high volatility given by the existence of online transparency, and high adaptability to consumers preferences.

4. The new technologies in retail and their impact on costs

It goes without saying that a company needs to fulfil its clients' expectations if it wants to survive and prosper. But, as practice often shows, it is not sufficient to have something to sell that someone else wants to buy at an agreed price. The client will be won by the lower price and/or the easiest operation - the one with the least transaction costs. A fiscal effect is also to be taken into consideration (Baba, 2012). A company has now means to reduce the transaction costs by incrementally improving the processes of the conventional retailing or it can introduce completely new ways of reaching the customer and insure delivery to his place.

There are several modalities that can be put in place in order to obtain and maintain a low cost advantage in an online activity; for markets and activities oriented towards price-dependent buyers, this would induce a differentiation based on asking prices to the merchandise or services in question (Băcanu, 2010).

We consider that the maximum efficiency of the human labour in retailing is largely attained. Any additional investment in labour is likely to fall under *the law of diminishing return*, in other words this investment will actually reduce the labour efficiency after a tipping point is reached.

There is the question of what is happening at the margin when, say, the labour union wins some new benefits for its members or when the government, at the request of the same labour unions or public pressure, is raising the minimum wage or is expanding the benefits.

The consequence will be an improved welfare package for the unions' members (with some spill over to other parts of the society). But, as Bastiat (1845) shows, one should examine not only the visible (thus evident) side of a situation, but also the unseen one, as this could become critical in the overall analysis.

The chain of reasoning goes as follows: the increases gained by the labour need to arise from somewhere. It is either from the customers (increased prices) or from the shareholders (reduced profits, reduced amortization, reduced investments, etc.). But it is known that the seller will sell b the maximum price that the market bears, in other words, the demand at that price level is inelastic (at least short to medium term). That leaves only the profits as the source for the labour's gains. The shareholders will thusly see their cash flow worsen, threatening their own welfare while possibly the existence of the company itself might become a going concern.

The company is then compelled to reduce the costs. But it is very difficult or even impossible to reduce the headcount. So, the path chosen by many is to invest in capital goods, in automation. This is improving the efficiency while flattening the costs. This posture is further improved by the natural attrition of the workforce. After several cycles, the companies are producing more with less labour; the overall participation rate is decreasing, while it is to be expected that the labour costs are increasing.

In the new IT era, Moore's Law (1965) observes that the computing power of microprocessors doubles approximately every 18 months, even if this rhythm will not be possible to maintain indefinitely, as the author himself later pointed out. The automation is dependent on computing power so we can infer that its power and cost is in lockstep with the microprocessors' one.

The cost of a given automation solution is then bound to fall through the same curve that computers' prices are taking. It gets more and more inexpensive to implement automation in retail (and not only) – almost independently of which technological path is exactly chosen. The yearly cost of implementing, amortizing and supporting an automation solution has a tendency to decrease.

Per a contrario and as stated above, the cost of labour has a tendency to increase mainly due to political pressure of Unions and almost independently of the productivity, as it would be standard.

These two tendencies will cross at some point in time. It was suggested that when the yearly cost of an employee performing a job goes above the yearly cost of

the automation performing the same job, an economic singularity will occur. This singularity will not occur at the same time across the entire global economy but it will rather be a drawn out radical change of means of production associated with yet unknown social effects. However, the most positive effect would be that this process goes to the stage of widespread joblessness associated with an abundance of cheap products.

Hon Hai Precision Industries better known as Foxconn - the producer of the iPhones, started investing in automation and replacing the human labour ever since the labour pool was exhausted and the labour compensation flew, in 2000. The production increased but the headcount did not.

The criticists of the automation in general and in retail in particular deplore the technological advances and dread them, as avoiding uncertainty is human and understandable to a point. But society is growing richer only by doing more with less, freeing labour for other yet unimagined jobs, and increasing, for example, the leisure opportunities.

The automation in retail will absolutely reduce the need of human labour. This is a setback for those currently employed in retail but they will be freed to pursue different lines of work. Ultimately, the benefits to the consumers will be unimaginably vast and they are by rights outdoing anything else.

5. Conclusions

The study of the impact of new technologies on the costs of retail companies which decide to implement them was conducted in two main areas: methods of implementing new technologies in e-tail and their measurable impact on transaction costs and overheads. The approach meant confining the research directions and focusing on relevant elements. Thus it has been avoided operating with a massive volume of information that would have had an effect of overload and distortion on investigating the relationship between the propensity to new technologies and general behaviour of the firm, the said strategy.

Facts and their associated reasoning show that there is a positive impact of the new technologies on the retailer's operating costs, especially labour costs; this is associated mainly with the predictability of the automation costs versus the relative unpredictability of the labour costs on one hand and the pervasive efficiency of automated processes in relation to fluctuating productivity of the personnel on the other hand. The stated impact of the new technologies is shown by the increase in segment represented by those who adopt a technological solution and invest in automating their processes. The same type of impact and mechanism is detected in terms of transaction costs.

The impressive evolution in terms of turnover of some giants of e-tail (such as Amazon) has demonstrated that e-commerce can flourish due to and based on new

technologies. This has given room to creating new business models that allow expansion and in the long run have proven to function with slight or null margins, thus eliminating competitors that could not adjust as fast as necessary to the new reality outlines. This goes to the contrary of the consecrated theory stating that no business can survive in the long run with null margins, especially due to fixed costs that burden the profit equation.

While this is still very much valid for the classical business models, new technologies and their use in creating automated processes have made possible some lenience over constraining strategic actions to be taken when focusing on undercutting pricing strategies.

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