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Influence of Self-Service Technology in North America
For Retailers and Job Market

I am a international student from Taiwan. Taiwanese people are always proud that our

high technology industry is vital to the world supply chain. But my confidence was a little bit

shaken after I came to Minnesota. One day I went shopping at the CVS pharmacy store on

Washington Street, and I saw a machine that I could not discern at my first glance. What I

actually saw was a self-checkout machine(SCM). I promise that I have never seen that before

in my life. At that moment, I did not see so many people using that machine, most of the

customers still chose to use the old-fashioned way, checkout by a cashier. I began to wonder if

these kind of machines are not adopted by the customers, why would a company implement

them? Giant companies like CVS must have a very good reason to place them in stores, so

what is the reason that they think consumers would use it? And, if this kind of machine is

truly widely adopted by buyers, does that mean those clerks lose their jobs forever?

Extensive research about why people will or will not use self-service technology and how

a retailer should implement these kind of SST machines have been performed

exhaustively(Hsieh, 2005; Wang, Harris, & Patterson, 2012). But the exploration of the

relationship between employment, company profit and the implementation of SST is rarely

discussed. Therefore, this paper aims to find out the relationship between SCM and the

change of job market; does SCM help job market or not? Also, this paper will try to show the

correlation of self-checkout machine and the profit of company who adopted it; is the policy of implementing SST product like SCM beneficial or not?

Social phenomena are the most complicated things in the world. To analyze one is an even more convoluted task. In this research, I will begin with the basics of how job market or company revenue may grow/reduce to customers'/retailers' attitude toward SST. Therefore, this paper will be arranged as follows: first, the history and the purpose of SST will be mentioned. Second, what the other authors have said about the pros and cons of using or not SST will be addressed. Third, the reasons why consumer would adopt or not the SST will also be discussed. Fourth, factors that will influence the companies' revenue and employment rate will be presented. And then, the analysis of statistics will be discussed. Finally, conclusion and future work will be detailed.

Introduction to Self-Service Technology

The emergence of SST was much earlier than people may have thought. The first introduced SST product was the automated teller machine(ATM), which was presented decades ago(Dean, 2008). With the introduction of the ATM, automatic retail transaction is more and more common these days.

The core design idea of SST is to skip the involvement of employee by technological interfaces(Meuter, Ostrom, Bitner, & Roundtree, 2000). Traditionally, every single service would need one or more people to help customers get things done. And the cost of this person-involved process is very high and sometimes inefficient or even worse. Hence, the debut of SST product was meant to save time and save money. But at the beginning, this technology was not widely adopted by customers. Those who dominated the shopping market did not want to accept this new trend(Dean, 2008). However, this technology planted a seed

for their next generation. This is why people have adopted the ATM widely, and the use of SST has been increasingly common to people.

Nowadays, four primary types of SST are being used(Bitner, Ostrom, Meuter, & Clancy, 2002): (1) telephone-based technology & interactive voice response; many companies like Wells Fargo use this kind of SST to respond to credit card billing etc (2) direct online connections and Internet-based interfaces; the most commonly seen SST product of this type is ATM, and also the pay-at-the-pump gas stations (3) interactive freestanding kiosks; in airport you can easily find machines of this type that can help you print boarding pass, and (4) video or CD/DVD technologies - this kind of SST usually are applied for educational purpose.

Among the above SSTs, this research paper will frequently use self-checkout machine(SCM), which is of the second type mentioned above, as a symbol to represent the SST products.

Now, we know how exactly SST bonds to our daily life. Next, we should understand why retailers decide to use them.

Both sides of implementing SST for retailers

Implementing SST is not a tiny task and not cheap at all as well. The price of a single SCM costs nearly 22,000$USD(McGrath, 2010). The decision makers of companies should have a very good reason to convince their shareholders that such a big investment would pay off. Therefore, the advantages and disadvantages of investing in SST are discussed.

The advantages of SST are of immense value to retailers. Apparently, in terms of productivity and cost-saving, retailers want to reduce the cost of human resources. With SSTs, as mentioned before, companies do not have to hire so many cashiers and clerks to serve customers one-by-one, and thus can largely benefit from this investment in SST machines.

As I have mentioned, CVS pharmacy implemented SCM but Corner W, which is located only two blocks away from CVS pharmacy, does not. Although SST is so beneficial to retailers, drawbacks certainly should also be considered for retailers. Drawbacks of setting up these expensive machines are listed as follows: (1) If people do not use it, then it will be a total waste. (2) Company should also hire a person to supervise the customers who use self-checkout machine. Therefore, it is another kind of expenses. (3) The stability of this kind of machine can always be questioned; will it make mistake during the process of checking out? (4) When it malfunctions, additional cost for a company to repair it is unpredictable. (5) If a bad experience happens, customers will probably not come back(Wang, Harris, & Patterson, 2012).

In the real world, trillions of dollars were invested into SST implementation(IHL Consulting Group, 2008) and this number is ascending every year. Obviously, retailers deem the benefit larger than the loss. But, as I have mentioned, if people do not use it, then the money invested will never flow back. What really matters is whether customers buy it. If they don't, the SST industry will collapse and the structure of job market may be different from now. Hence, next step we are concerned about is what really matters to consumers.

Why people do or do not use SST

Consumers care only about their own convenience. They care only about whether they need to wait in a long line, or whether they can swiftly get things done. That is, what matters most to customers is their experience during shopping.

Lin & Hsieh (2011)sumed up the "dimensions" that will affect customers' attitudes toward SSTs. From my point of view, what matters are: (1) functionality; this includes stability, ease and the result. People care most about whether their transactions can be done or not, so the basic core functions matter most. If a single transaction cannot be completed correctly,

then the impression of shopping experience can not be anticipated. (2) security/privacy; if someone's credit card number is leaked after purchasing by SCM, the person definitely will not have a good impression about it. Companies will lose trust from customers once their personal data are leaked and probably consumers will also choose not to buy anymore. (3) convenience; this indicates the accessibility to the SCMs. If people cannot easily find one SCM to use or they still have to wait in line for SCM, certainly nobody will be satisfied.

As for the author, I care a lot about the total time that could be spent on transaction. I choose whatever could be faster. If people wait in long line in front of the check-out desk, I will choose SCM. If too many people are waiting for SCMs, then I will tend to choose the old-fashioned way. But I discovered an interesting fact. Usually the SCM get crowded not because the stability issue or others, but because the consumer do not know how to use it correctly. So maybe the process of using this kind of SST product is still not so fluent or easy to people.

After knowing the decision criteria for retailers and customers. We consider the big environment, the bigger outside reasons that will make the job market and company revenue fluctuate.

Factors that will affect the employment rate

Reasons for unemployment can be categorized into many groups. What this research are concerned about are cyclical unemployment and structural unemployment. Cyclical unemployment happens when the demand of total society for goods and services falls, and thus, less production is needed so people who can and want to work are involuntarily unemployed("Unemployment", n.d.). This type of unemployment may result from the big environment; for example, recession. If the society is in recession, people buy less and job providers reduce their employees. Structural unemployment occurs because there is a

"mismatch between the skills of the unemployed workers and the skills needed for the available jobs"("Unemployment", n.d.). For instance, the use of SST may reduce the demand of clerks and cashiers, and then cause job reduction in some service jobs. But, in general, the kind of unemployment could reduce the job vacancies in manufacturing as well.

Therefore, when discussing the unemployment of SST-related manufacturing industry or service industry, we can not credit all the effects to SST or other single reason.

In order to comprehensively consider all the possible facets connected to our research topic, we must go one last step to find out the reasons that will affect a company's revenue.

Factors that have influences on company's revenue

According to Wirth(2010), what may contribute to a company's performance are: the flexibility to change due to new trends, the efficiency of both conveying and fulfilling management decisions within the company, and the quality of personnel. In other words, almost every decision or policy of a company could make difference to company revenue. Pricing, return policy, discount policy, sales volume, etc., all of them are significant elements to the revenue of a retailing company. Also, the big environment have effect. In recession, revenue of a company drops.

On the other hand, big companies usually will not sell only one product. They sell multiple products simultaneously and sometimes they even have many business groups. Again, every product has its own marketing policies(e.g., pricing) and each business group also have its developmental directions. This makes the complexity of discriminating what causes growth or loss even higher.

Last but not least, in next section, real world data will be shown to help clarifying the relationship between job market and SST, and the growth of revenue of SST-related companies.

Analysis on statistics

I plan to analyze the trend of recent years' revenue of retailers and manufacturers, and number of SST-affected industry workers to see if a relationship does exist among those statistics.

Revenues of Retailers who use SCM (in million USD) table 1

Retailers	2013	2012	2011	Annual Growth Rate(%)
Target	72696	73301	69865	2.04634617044522
Wal-mart	476294	469162	446950	3.24492031313062
CVS pharmact	126761	123133	107100	8.95826446247464
Walgreen	72217	71633	72184	0.0259698267994548
Sainsbury(J)	38071	36839	35599	3.41376289326622
Costco	105,156	99,137	88,915	8.78388454460629

Note: Data retrieved from http://www.cnyes.com/USASTOCK/index.htm?ga=nav

From table 1, we can see that the growth rate are all positive number, it implies self-checkout machine may bring benefit to these retailers. But the deviation of annual growth rate among them are within 5%, this may also suggest that the implementation of SCM in these companies does not necessarily affect their revenue. The growth rate may result from other reasons.

Revenue of Self-Checking Machine Manufacturers(in million USD)table 2

Manufacturers	2013	2012	2011	Annual Growth Rate(%)
NCR	6125	5730	5433	6.18006789996752
IBM	99751	104507	106916	-3.40203102065546
Fujitsu	46433	53018	56738	-9.48838127454377

Note: Data retrieved from http://www.cnyes.com/USASTOCK/index.htm?ga=nav

Table 2 signifies that the SST-as-major-product company such as NCR should profit because of self-checkout machine. But the other two companies suffer from recession. The

author thinks that it is because the other business groups are shrinking. IBM and Fujitsu are two of the biggest companies in the world. To analyze the reason why their growth rates are negative is way beyond the topic of this research paper.

Number of Workers in the US(in thousands) table 3

	2013	2012	2011	2010	2005	Annual Growth Rate(%)
Cashiers	3254	3275	3158	3109	3075	1.21521570429
SST related workers	2613	2602	2438	2488	2496	1.26895703242

Note: Data retrieved from http://www.bls.gov/cps/tables.htm

From table 3, the occupation that I thought may suffer from reduction because of self-checkout machine grew positively, and the industry of SST-related manufacturing workers grew, as expected. This tells us that due to some reasons, the cashier jobs did not reduce because of any SST products. And, the SST-related job market may benefit from this technology for we see that the number of workers in this field grows.

Discussion

In the analysis section of this paper, we see SST may probably have positive effect on both job providers and workers, but not necessarily. There are thousands of elements that contribute to revenue and this paper just pick some all of them. But at least we can tell that the job providers and receivers may not be damaged by the use of SST. The reasons why the statistics do not show very strong relationships between them could be: (1) The amount of money invested in implementing SST contributes a relative small percentage of those giant companies' revenue. It may be too small part for the companies, so the statistics reflect nothing. (2) As I mentioned before, the world is too complex to analyze, sometimes big environment matters. If in recession or the opposite, it is hard to use simple methods to dissect the relationship. (3) Another possible reason is that the pros and cons of SST may not

be fully understood by people, so company/people decide biasedly. The emergence of SCM is within the last ten years. Maybe the time has not been long enough for generations of people to get fully familiar with it, so the benefits of SST to retailers may not be that obvious in statistics.

Future work

There are plenty of topics that worth exploring in SST and its relationship with other entities. What is still underdeveloped with respect to this research is, concerning behavioral differences from culture to culture, from area to area. Like what I have mentioned in last section, we can wait longer to conduct this kind of research in long-term. Research on the tendencies to use SST between occupations, states, areas and continents still remain veiled. If the work can be done, companies can design their own SST policies accordingly to make their profit maximized. Also, from the protection of the environment point of view, the world can suffer from less resources waste in the future. Similarly, if we wait longer to examine the long-term effects of using SST, the result of the relationships between job market and company's revenue may be much clearer and more persuasive.

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