STUDYING THE EFFECTS OF BARCODE UTILIZATION ON ERROR REDUCTION AND REDUCING DELAYS IN PRODUCT DELIVERY AND UPDATING THE FIRMS’ INFORMATION (CASE STUDY OF ISFAHAN STEEL COMPANY)

ALI ROSTAMI\textsuperscript{a1}, SHAHABEDDIN ROKHSA\textsuperscript{b}, MA’BOUD ABBASZADEH\textsuperscript{c}, SEYEDE FOROUZAN JAVAHERISHALMANI\textsuperscript{d} AND MAHDIEH SHAHRABI FARAHANI\textsuperscript{e}

\textsuperscript{a}Faculty Member of Payam-E-Noor University
\textsuperscript{b}M.S. in Business Management
\textsuperscript{c}M.S. in Strategic Management
\textsuperscript{d}M.S. in Financial Management

ABSTRACT

The purpose of the present research is to determine the effects of barcode system use on reducing the errors, reducing delays in product delivery and updating the information. The research method is descriptive (surveying). Statistical population includes all personnel working in stores of sales units in production line of Isfahan Steel Company, from which 384 ones were selected randomly as samples. Considering the nature of the subject, data collection tools are questionnaire and interview. Data analysis was performed in two levels of descriptive statistics (abundance, average) and inferential statistics (regression model). Findings indicate that using barcode in manufacturing companies would affect the error reduction and speed increase and finally the profitability.

KEYWORDS: Barcode, Income, Profit, Error Reduction, Time, After-Selling Services

Entering the machine systems along with human active systems has had great effect on managerial processes of most manufacturing organizations. Administrative machines and new managerial information technologies compose major part of today organization assets. Basic advantages of information mechanical systems include time saving (make complex the time of operation); profitability (giving information by processing data); dimensions (unexpected extent of any important information); and form (getting deferent forms to increase the users’ exploitation) (Shoham, 2010).

Barcode is one of the powerful means of automatic detection; it is indeed the understandable language of data entering the computer. Barcode gives a way for communicating among computer systems. The contact is bilateral since the code printed by a system is readable by another one and the information changing is obtained without the need to any individual (Selmeier, 2008). Barcode use will increase the speed and precision of the information entering a mechanized system and give the opportunity of providing exact and on-time reports (Hec\textsuperscript{t}, 2001).

Today, information systems have extensively improved the ways of error reduction one of which is the technology of automatic data collection. Considering the problems of manual systems for recording and collecting data and its errors, performing the mechanized methods of data collection and controlling data seems necessary in order to facilitate the performance and minimize the errors.

Using barcode system would decrease the untrue guesses about materials and segments of production line and confirm the time of order delivery to the customer. The way of using barcode will increase the employees’ sense of trust and dependence because the exact date and time of each contract and interaction beginning and its end are digitally recorded (Russ, 2011).

It allows you to provide necessarily the thing you really need. Its advantage is that if you don’t have a product of a section adequately, barcode system would provide it quickly or you may ask who have consumed it and why (Hec\textsuperscript{t}, 2001).

Considering the mentioned subjects above and the growing importance of using barcode system in industrial and commercial companies, the purpose of the present paper is to study the effects of barcode utilization on reducing errors and delays in delivering the products and on updating the firms’ information.

\textsuperscript{1}Corresponding author
LITERATURE

Barcode is a set of bar lines with different widths (wide and narrow). The size of each line includes a special concept for barcode reader machine. In fact, barcode reader is a machine that visually illustrates the information on the screen (Hosseini and Fathi, 2001). In a more exact definition, barcode includes transferring the data through light waves (Russ, 2011).

Barcode is of the first and the most important technologies available in automatic discussion. Although passing about three decade since its invention, for some reasons such as lower cost and easy usage, the technology is still presented as the most useful one in the area. With respect to the given definitions about automatic detection, barcode is indeed the understandable language for entering computer the data (Khalili, 2010).

The most important advantage of barcode system use is that it decreases the untrue guesses about material and segments of production line and would confirm the time of delivery and minimize the delays (Lovgue, 2011).

The way of using barcode will increase the sense of trust and dependence among employees because the exact time and date of beginning and end of every transaction and contract will be digitally recorded (Russ, 2011).

Conceptual Framework and Presenting the Research Model

Eberfield (2012) in his study has come to the result that the use of barcode would significantly decrease the errors. Nahavandian (2008) also reached the same result. In their research related to the effects of barcode on the efficiency of chain stores, Sadeghi et al. (2008) concluded that barcode facilitates the works and while decreasing the errors, it would increase the speed. Dehghan (2009) also concluded that tracing the products by using barcode is significantly easier. Referring the mentioned literature, codifying the conceptual model of the research is as follows: as shown on the following figure, independent variables like error and updating the information, each would individually influence on the dependant variable of firm profitability.

(Independent variables)

Use of barcode → Error reduction
Time reduction

(Dependant variable)

increase of firm profitability

RESEARCH HYPOTHESES

H1: error reduction by using barcode would affect the firms’ profitability improvement.

H2: reducing the time of data collection in accelerating and updating information by using barcode would affect the firms’ profitability improvement.

Eberfield (2012) in his research about barcode use in chain stores concluded that barcode facilitates the works and allows more speed with fewer errors.

Hurry & Burk (2006) in a study about the effect of barcode on profitability came to conclusions such as error reduction and time saving both of which are effective in profitability.

Barcode is one of the fast and most exact ways of entering the information on the systems. Studies show that entering the information by using keyboard, at the best condition, among 300 characters only one wrong character may enter the system. While, for barcodes, such error may occur for every one million characters and most mistakes are detected by adaption figure method. This is the reason for which the international blood transfusion organizations use this method (Russ, 2011). Even, by the simplest scanners, it is possible to read for example, 12 coded characters in less than 2 seconds, while even with the fast operators, this will need time at least 3 times the mentioned one (Dehghan, 2009).

Barcode may be installed on a wide range of materials and is easily readable. Code sizes and volume could be tuned in a way that they could be located on the target place and it is possible to produce labels that can be easily installed on smallest places like electronic sections (Motaghi, 2009).

All these characteristics make possible the use of barcodes in different fields. For example, in big stores, barcode has increased the control by 30 percent and sales and inventory reports are quickly available through barcode use (SadeghiForooshani, 2008). Considering the above mentioned, the main research question here is whether using barcode system would affect error
reduction and delay reduction in goods delivery and updating firms’ information system.

METHODOLOGY

Since the purpose of the present study is to consider the effects of barcode system use on reducing the errors, reducing delays in product delivery and updating the information, the research method is descriptive (surveying). The purpose of performing such research is to orderly and really describe the profiles of a situation or a subject. Descriptive (surveying) method is the one for collecting data, in which certain individuals are asked to respond a number of special questions that are the same for all (Sarmad, Bazargan and Hejazi, 2003).

The statistical population includes all Steel Company employees. Cochran formula has been used to estimate the sample size because in this formula it is possible to inter the population size as well and obtain a reasonable sample (Hafeznia, 2010). The sample size obtained in this research was 384 persons.

Random sampling was used to select the samples. With respect to the nature of the subject, as data collection tool was questionnaires and in order to measure the research variables, the researcher-made questionnaire was used. To measure the questionnaire reliability, the Cronbah Alfa index was used. Based on Cronbah Alfa, the questionnaire reliability was 0.741, which seems statistically proper for the research ends, because a validity index of 0.70 or more usually is sufficient for research aims (Delavar, 2005). Data analysis in the present study was performed by SPSS.16.

RESULTS

H1: error reduction by using barcode would affect the firms’ profitability improvement

By applying regression method, we will consider the effect of some factors such as reducing the error in entering the data, reducing error in enter and exit of the products to and from stores, decreasing the results of wrong information sending and declining the product wasting as the advantages of barcode utilization (independent variable) on the improvement of firms’ profitability (dependant variable). A number of fitness indexes are shown on Table (1).

Table 1: Regression model indexes

<table>
<thead>
<tr>
<th>R Square</th>
<th>R</th>
<th>Sig.</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.803</td>
<td>0.896</td>
<td>0.000</td>
<td>387.19</td>
</tr>
</tbody>
</table>

Regarding the significance level obtained from F test (equal to 0.000 that is lower than 0.05), we find that regression model has been proper for the fitness and the model determinant coefficient is equal to 0.803. Thus, 80.3 percent of firms’ profitability improvement (dependant variable) could be explained through advantages of barcode employment (independent variable).

Based on Table (2), the significance level related to independent variable coefficients is less than $\alpha = 0.05$; they have meaningful effects on profitability improvement.

Table 2: Regression model results

<table>
<thead>
<tr>
<th>Sig.</th>
<th>t</th>
<th>Standard coefficients</th>
<th>Non-standard coefficients</th>
<th>B</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Beta</td>
<td>Std. Error</td>
<td></td>
<td>Constant coefficient</td>
</tr>
<tr>
<td>0.000</td>
<td>10.836</td>
<td>0.982</td>
<td>10.64</td>
<td></td>
<td>Reducing errors in entering data in computer</td>
</tr>
<tr>
<td>0.000</td>
<td>6.647</td>
<td>0.477</td>
<td>0.175</td>
<td>1.160</td>
<td>Reducing errors in the enter and exit of products and materials to and from stores</td>
</tr>
<tr>
<td>0.000</td>
<td>4.454</td>
<td>0.252</td>
<td>0.258</td>
<td>1.151</td>
<td>Reducing damages resulted from wrong information sending</td>
</tr>
<tr>
<td>0.017</td>
<td>2.400</td>
<td>0.232</td>
<td>0.183</td>
<td>0.439</td>
<td>Reducing the product wasting</td>
</tr>
<tr>
<td>0.049</td>
<td>0.043</td>
<td>0.002</td>
<td>0.201</td>
<td>0.009</td>
<td></td>
</tr>
</tbody>
</table>

So, this hypothesis is accepted and one may say that error reduction by barcode is effective in profitability improvements. The more is the regression index, the more is the effect of independent variable on dependant one. In this model, the factor of reducing errors in entering data in computer has the most effect on profitability and the factor of reducing product wasting has the least effect.
H2: reducing the time of data collection in accelerating and updating information by using barcode would affect the firms’ profitability improvement

By applying regression method, we will consider the effect of some factors such as reducing the time in after-selling services, reducing the production time, decreasing the results of data collection while selling and accelerating and updating the store inventory information as the advantages of barcode utilization (independent variable) on the improvement of firms’ profitability (dependant variable). A number of fitness indexes are shown on Table (3).

<table>
<thead>
<tr>
<th>Table 3: Regression model indexes</th>
</tr>
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<tbody>
<tr>
<td>R Square</td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td>0.886</td>
</tr>
</tbody>
</table>

Regarding the significance level obtained from F test (equal to 0.000 that is lower than 0.05), we find that regression model has been proper for the fitness and the model determinant coefficient is equal to 0.886. Thus, 88.6 percent of firms’ profitability improvement (dependant variable) could be explained through advantages of barcode employment (independent variable).

Based on Table (4), the significance level related to independent variable coefficients is less than \( \alpha = 0.05 \); they have meaningful effects on profitability improvement.

<table>
<thead>
<tr>
<th>Table 4: Regression model results</th>
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<tbody>
<tr>
<td>Sig.</td>
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<tr>
<td>------</td>
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<tr>
<td></td>
</tr>
<tr>
<td>0.000</td>
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<td>0.000</td>
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<td>0.000</td>
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<td>0.000</td>
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</tbody>
</table>

So, this hypothesis is accepted and one may say that reducing data collection time by using barcode is effective in profitability improvements. In this model, the factor of accelerating and updating the store inventory information has the most effect on profitability and the factor of reducing the time in after-selling services has the least effect.

**DISCUSSION AND CONCLUSION**

One of the common qualitative problems of industrial units is the low level and high spread of qualitative features of products. The complexity of processes causes the managers not to be able to make proper decisions to solve the problem. To conduct the product qualitative variables to a desirable direction, it is necessary at first to recognize such variables and the reason of their creation. In this regard, barcode system with its high abilities is able to help the organization to achieve a desirable level of production (Kazemi, 2008).

Girdhar (2010) believes that using barcode system have many benefits including increasing the care that decreases human mistakes; increasing the speed that is able to read 12 characters in less than 2 seconds and flexibility that is usable anywhere and for any product. By increasing the care, quality and speed of operations, it will improve the efficiency.

Heydari et al. (2009) concluded that using modern managerial information is necessary and firms using barcode system are full of profits, so it is vital to sufficiently inform the managers in this regard.

Dill (2007) has found evidences of investments on information technology at industrial levels. Indeed, the profitability improvement occurs when it is along with investing on electronic transactions and especially, coding the products.

The research shows that 88.6 percent of firms’ profitability improvement (dependant variable) could be
explained through advantages of barcode employment (independent variable).

Indeed, barcode is a suitable tool for evaluating time and work and not only helps to remove the defects, but also plays an important role in declining the duration of work cycle (Lovgue, 2011). Sadeghi (2008) believes that optimized work and quick communication of information, less errors, time saving and economizing the consumption of paper are of major advantages of using barcodes. With respect to the growing increase of goods diversity, barcode utilization has been part of the process necessities for tracing the products, cutting the costs and firm profitability. Using this technology, one may specify special serial to differentiate the goods from each other.

REFERENCES


