THE EFFICIENCY OF USE OF MULTIMEDIA METHODS IN TRAININGS AND RELATIONSHIP BETWEEN FEATURES OF TRADITIONAL AND MULTIMEDIA TRAININGS ON THE BASIS OF CONDUCTED RESEARCH

MAGDALENA KOTNIS
Uniwersytet Szczeciński

Summary

The paper describes the use of IT (multimedia) in trainings. Selecting a method of training with the use of multimedia is nowadays done by trial and error. Companies running courses do not know what kind of benefits they may have for themselves and for their customers if they use multimedia. Therefore the identification and analysis of economic efficiency factors helps to figure out, what factors bring benefits when using multimedia in trainings. The article describes also statistical methods witch are used to solve an economic problems. Giving for example using Spearman coefficient as a method to analyze shows results of research of 74 Polish companies making accessible multimedia trainings and/or by Internet. The results give a worth full knowledge how the multimedia techniques influence on the profits of the companies.

Keywords: information technology, multimedia training, efficiency of multimedia methods in training

1. Introduction

The research was conducted in order to diagnose the market of training services in Poland. The results are based on data from questionnaires dedicated to companies rendering training services with the use of multimedia and/or via Internet on the field of management [5, 6]. 75 companies were examined during research. The questionnaires were issued in 2003. Empirical data covered years 2001-2002 and described trainings with the use of multimedia. The addresses of companies were found in the database of the Institute of Management and on the Internet. The following selection criteria were applied: a subject of training is management, type of training – those using multimedia and held via Internet. The subject of training – management – was selected for the research because of increasing demand for this field of study and because such a training doesn’t require any computer tools.

In the aspect of researches on effectiveness of trainings realised by means of multimedia techniques, these measures let us specify the influence of used methods on such variables, as: number of organised courses, planned number of hours, trainers’ work-time, number of hours needed for elaboration of the training, number of participants that started the course, number of participants that ended the course, total cost of training per day, cost of preparing the training per day, cost of leading the training [7,8].

2. Methods of analysis

When performing efficiency analysis the efficiency function was taken into account, expressed by (differentiate and quotient function) [4]. In order to evaluate how far the goals were
achieved (efficiency of use of multimedia during training) the research used efficiency measure, which was examined in relation to a number of planned and realized trainings within the year in question and a difference between the number of trainees who finished the training and the number of trainees who started the training. In order to figure out the contrary aspirations, expectations and needs of people having the training, being separate groups of interest, the responsive evaluation was used, which is usually used in trainings [3]. In order to identify groups of factors which are more important than others for the company running trainings, the methods of taxonomy were used. Also method of Ward and Euclid’s distance were used for the analysis, as it helps finding dependencies between individual attributes for trainings with the use of multimedia trainings. The research also evaluated a frequency of answers and compared two sets of opinions of trainers and managers against the genuine frequencies. The research also analysed the dynamics of employment, conducting of trainings and profits of training companies.

Regarding analysis of relationships between features of traditional and multimedia methods sometimes qualitative feature can be ordered (with ascending or descending order). Such situation takes place when we can qualify level of the variable. For example feature education can be ordered from basic to higher. Such features as gender or eyes colour cannot be divided into stronger or weaker. For example, the variants for height can be as follows: tall, average, short. Grades can be as follows: excellent, good, sufficient, insufficient.

The most popular coefficient that can measure the strength of relationship is Spearman rank coefficient.

Spearman rank coefficient:

\[ R_{xy} = R_{yx} = 1 - \frac{6 \cdot \sum d_i^2}{N(N^2 - 1)} \]

where:

\( d_i = r(x) - r(y) \) differences between rank of X and rank of Y, \( N \) – total number of units

The procedure can be started by subordinating variants of each feature values from natural numbers from 1 to n, counting from the weakest to the strongest (or reverse). This is a ranking process. In case of existence of two or more the same variants, an arithmetic mean from subsequent numbers should be calculated. For convenience we can start from ordering variants of a feature in ascending or descending order, but we must remember that features are paired \((x, y)\).

Spearman rank coefficient measures both strength and direction of relationship. It is symmetrical, e.g. it is not significant, which variable is treated as dependent and which as independent. It takes values from the interval \([-1, 1]\). If its module equals 1, then relationship is functional and when it is 0, then there is no relationship between variables.

Direction of relationship is measured by coefficient’s sign. If ranks of both features aim in the same direction then \( R_{xy} \) is positive and vice versa. Spearman coefficient has significant fault – results close to 1 do not necessarily indicate on high correlation, but only high correlation of ranks [9].
3. Research results

The preliminary research of a Polish training market shows that in a large extent the trainings declare to be held with the use of multimedia and are conducted in a traditional way, but with a significant help of multimedia. The subject of multimedia techniques used in trainings has not been so far uniquely defined. There has not been made a direct distinction between traditional training (which are nowadays usually held with the use of a presentation, film or the Internet) and training with the use of multimedia (which should be integrated training programs as systems, platforms or applications). Therefore so many companies who declare to have trainings with the use of multimedia (54 companies) in fact held traditional trainings (22 examined companies).

The research says that a large number of companies do not make a distinction between trainings with the use of multimedia and trainings with the use of a presentation. 86% out of 54 companies use an overhead projector and 93% use presentations with the use of a personal computer or an interactive board. And only 60% examined companies declare that their trainings are held with the use of multimedia. Only 53% of companies who declare to have trainings with the use of multimedia declare also the use of computer systems or training platforms. Thus the results of the research are along with the trends of having trainings with the use of a presentation. At present it seems that having traditional trainings combined with some techniques and help of multimedia is the most efficient solution for training companies.

The research gives the answers for the following questions: What is really important for the success of training company? On which factors of the training process the managers really care? Use of methods of taxonomy (Ward’s method and Euclid’s) help to understand the importance of factor. Euclid’s formula is following defined [1]:

\[
d_{ik} = \left[ \frac{\sum_{j=1}^{m} (x'_{ij} - x'_{kj})^2}{m} \right]^{\frac{1}{2}} (i,k = 1, 2, ..., n),
\]

\(d_{ik}\) - distance between \(i\)-object and \(k\)-object; 
\(x'_{ij}, x'_{kj}\) - standard value \(j\)-variable for \(i\)-object and \(k\)-object according to formula:

\[
x_{ij} = \frac{x_{ij} - \overline{x}_j}{S_j} (i = 1,2,...,n; \ j = 1,2,...,m) ; \quad \overline{x}_j = \frac{1}{n} \sum_{i=1}^{n} x_{ij} ;
\]

\[
S_j = \left[ \frac{1}{n} \sum_{i=1}^{n} (x_{ij} - \overline{x}_j)^2 \right],
\]

\(m\) – number of value, 
\(n\) – number of objects.
The factors show clearly, which of them are the most important for managers. Diagram shows below all factors and the number of groups.

Euclid’s tree

Fig. 1. Diagram of Euclid’s distance.

The diagram shows number of training’s factors. The training’s factors are grouped into four groups. The groups include the most similar factors.

1. increase number of members
2. low price
3. shorter time of training
4. blended learning
5. a synchronic consultation
6. synchronic consultation
7. height technology as training’s tools
8. interactive training
9. efficient of use of time
10. well-known trainers
11. prestige of company
12. members’ satisfaction
13. professional prepare materials
14. interesting subject
15. warranty and quality
16. realization of goals
17. height level of education
18. adapt to customer’s needs

After that the number of factors were reduce by the combining of the nearest clusters of factors [2].
The managers answer which factor is most important for them. They put 1 point for the most important factors and for the unimportant they put 4 points. The factors are selected in order to appoint four groups depending on level of importance. The average estimate for each group shows which of the group include the most important factors. The factors assure an effectiveness of training. The group with the lowest average estimate shows the most important factors. The average estimate for the group 1 amount to 2.46, for second group 1.31, for group 3 amount to 2.06 and for fourth group is 1.86. The solutions show the most important factors are presented by second group.

To the second group belong follows factors:
- adapt to customer’s needs
- height level of education
- warranty and quality
- realization of goals
- professional prepare materials
- interesting subject
- members’ satisfaction

To the important factors belong the factors of the fourth group:
- prestige of company
- well-known trainers
- efficient of use of time

Indifferent factors are described by third group and to them belong:
- interactive training
- synchronic consultation
- height technology as training’s tools

The last group include the unimportant factors of training. The managers consider the factors are less important for making a profit in training’s companies. The factors like:
- a synchronic consultation
- blended learning
- shorter time of training
- low price
- increase number of members

can be as supplement of training’s offer, but each of them make any positive client’s decides about a will to take a part of the training.

The computing and multimedia factors like interactive training, synchronic consultation, height technology as training’s tools, synchronic consultation, blended learning, are situated in two groups (3 and 4). They are either indifferent or unimportant factors. The managers of the Polish training’s market think, the high technology and multimedia solution in training process don’t decide about the quality of training and about the demand for training.

It can be said the traditional factors like adapting to customer’s needs, height level of education, warranty and quality, realization of training goals, members’ satisfaction are still essential to a good image of training’s companies. The managers don’t see the needs for using the multimedia technology (presentations, computer games, digital situation’s games), the E-learning and network technology (Internet, Web Based Training, Computer Based Training).

Considering qualitative character of analysed features, relations between multimedia and traditional trainings were analysed by means of Spearman coefficient. The table below presents results
of analyses, led on 54 training companies, acting on the area of Poland, making accessible multimedia trainings or/and by Internet using subject-area “management”. Traditional trainings were numbered as 1, whereas the number 2 defined the multimedia trainings.

### Table 3. Spearman rank coefficients between type of training and selected variables

<table>
<thead>
<tr>
<th>variables</th>
<th>Spearman coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 number of organised courses</td>
<td>-0.406</td>
</tr>
<tr>
<td>2 planned number of hours</td>
<td>0.243</td>
</tr>
<tr>
<td>3 trainers’ work-time</td>
<td>-0.309</td>
</tr>
<tr>
<td>4 number of hours needed for elaboration of the training</td>
<td>-0.035</td>
</tr>
<tr>
<td>5 number of participants that started the course</td>
<td>-0.437</td>
</tr>
<tr>
<td>6 number of participants that ended the course</td>
<td>-0.453</td>
</tr>
<tr>
<td>7 total cost of training per day</td>
<td>0.023</td>
</tr>
<tr>
<td>8 cost of preparing the training per day</td>
<td>0.250</td>
</tr>
<tr>
<td>9 cost of leading the training</td>
<td>0.439</td>
</tr>
</tbody>
</table>

*Source: own calculations*

Each value with minus shows any relations between multimedia and traditional techniques. But the other values show little positive influence of multimedia on some factors. For examples:
- Application of multimedia techniques had little influence on planned number of hours.
- Small influence of type of training on total cost of training per day is indicated by use of multimedia techniques. Use of these techniques decease total costs per day.
- Multimedia techniques influence costs of preparing the training per day in a small degree.
- Traditional techniques in moderate degree influence the increase of cost of leading the training.

Using of Spearman coefficient shows that application of traditional training methods influence the increase of number of participants moderately. Also trainers’ work-time increases with use of traditional methods, while this relationship is relatively small. Further traditional techniques influence increase of number of hours needed for elaboration of training in a very small degree as well as of number of participants that started and ended training moderately.

### 4. Concluding remarks

The results of the research indicate that there is low demand on trainings with the use of multimedia on the Polish training market. The managers are afraid of using the computer technology in training. Including the multimedia technology to the training’s process is very expensive and return of cost could be never done. Although companies offering such trainings are more flexible and are capable of organising a large number of trainings, the conducted analysis shows that present the Polish society is not sufficiently developed yet in terms of technology to attend trainings with the use of digital means.

On the other hand, the companies are still not enough technological equipped to teach the worker via the Internet or by using the E-learning on Polish market. Participation in such trainings requires from the employer of person attending it, that to apply IT and network solutions in his
company. Such investments have substantial implications in terms of costs and reorganisation. The former one – relates to amount of costs spent on application of computer platform (hardware and software) and network (Internet and/or Intranet). Reorganisation relates to necessary changes in the work patterns, responsibility and function of all company employees, which needs time. Therefore the reason of current low demand on trainings with the use of multimedia is that Polish companies and institutions need time to adjust to IT standards in organisations acting in a global social-economic system. It can be noticed that the process of gaining IT solutions in Polish economy is subject to increasing number of IT applications. Thus, in relation with the dynamics of that process, a demand on trainings with the use of multimedia will change as well.

Moreover, the result of the research shows a low relation between traditional trainings and trainings supported by multimedia techniques. But using the Spearman coefficient to analyse a quantitative variables is useful and shows the reasonable circumstances to measure an influence of using a modern techniques on economical profits.

**Bibliography**


Magdalena Kotnis
Uniwersytet Szczeciński
Wydział Nauk Ekonomicznych i Zarządzania
Instytut Informatyki w Zarządzaniu
Ul. Mickiewicza 64, 71-101 Szczecin
e-mail: Magdalean.kotnis@gmail.com