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THE OTSM MODEL OF TRIZ CONTRADICTION FOR STUDENTS' SELF-MARKETING MANAGEMENT

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The aim of the paper is to analyze student self-marketing and improve the methods of student self-marketing management. The concept of student self-marketing, which consists of various activities undertaken by students to make themselves known in the marketplace, is characterized. The application of the OTSM TRIZ Contradiction model and selected methods for contradiction analysis in the field of marketing management are proposed. The results of a survey on students' self-marketing conducted among Poznan University of Technology students are presented. Several problems are identified and the contradictions in students' self-marketing management are formulated. The selected techniques and tools for analyzing and solving contradiction problems were listed with reference to ARIZ-85. The prospects of their application in problem solving sessions with students, inexperienced in TRIZ, are examined. Workshop sessions are conducted with three groups of students. In the first session, an analysis of the Operational Zone (OZ), the Operational Time (OT) and intense contradiction is applied. In the second session, ideas are generated with an additional analysis of the Principles of Separation (Time, Place, Condition). In the third session ideas are generated with reference to the TRIZ Inventive Principles. The obtained results generated with various TRIZ techniques are compared and evaluated. The research findings indicate the potential of OTSM TRIZ Contradiction modelling to guide several recommendations for developing student self-marketing management.

Keywords: TRIZ, model of contradiction, marketing management, self-marketing

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1. INTRODUCTION

Finding a job opportunity on the labor market has become increasingly difficult for people, especially for students who have just completed their studies with narrow professional experience. Every year, thousands of students are graduating and trying to find a job, and there is intense competition between them, which requires effective self-promotion knowledge. To be more visible to prospective employers, individuals can use methods and tools of so-called self-marketing, which was developed and has risen in popularity since the 1990s, especially in the USA (Shepherd, 2010, p. 589-606). Self-marketing means presenting the finest individual skills, knowledge, abilities and reaching a maximum number of people. Basically, it is the promotion of an individual as a future employee (Batra et al., 2009, p. 30). This tactic is universal and can be applied to anyone who is looking for a job. The most important thing is to know the desired field of work (Dolak, 1996-2008). One of the branches of self-marketing is students' self-marketing, which is more focused on students' recognition on the labor market. From a review of the literature, we noticed that students studying business and marketing are better prepared for starting their career path, and hence, self-marketing methods are becoming more popular (Manai, Holmlund, 2014). Self-marketing in the workplace has a significant impact on promotions at work. This process is remarkably like the concept of branding, but with the difference that instead of a product, individuals are promoted here. Different strategies and self-marketing plans should be considered while preparing for the opportunity (Merdin, 2011). Topics like the importance of self-marketing in the job search process, how to improve it to be more visible on the labor market and to search for jobs more effectively, are widely analyzed. The issue of personal branding and its management is complex, and includes, e.g., defining your own personal brand based on already known information and self-discovery; career management; the ethical aspects of personal branding, as well as knowing what you want to do in the future and finally finding ways to promote yourself (Gorbatov et al., 2018).

This paper applies the method and tools of the Theory of Inventive Problem Solving (TRIZ) to improve the management of students' self-marketing. TRIZ was invented in Russia in the 1960s by Genrich Saulovich Altshuller to, in the most general terms, "help the inventor to use his current inventory of knowledge and experience most effectively" (Altshuller, 1975) by adopting a systematic approach to solving complex problems. The theory has been greatly developed for solving difficult technical problems. However, over time its application has expanded into organizational, educational, and social problems as well as ones related to the business field (Chechurin, Borgianni, 2016). TRIZ is often used in marketing, development, improving career development (Nishiyama, Leleito, Sakai, 2017), supply

chains and production (Ruchti, Livotov, 2001, p. 1). TRIZ can be used to solve, for example, business problems, such as the number of people in a team in corporations or when a product degrades too fast, projects fail, sales drop, or to analyze the evolutionary potential of technological or a business system and propose next generations of the system, to predict potential failures in new products and processes and to prevent them and many others (Souchkov, 2007, p. 4). This method is widely used in the design process (Taşkın, 2019), product development (Ericson, 2009), creating and improving the marketing strategy (Ganesh et al., 2013). TRIZ is a theory, a methodology, a set of instruments, sometimes even treated as a philosophy which supports creative technical activities with systematic means. There are models of problem-solving processes, descriptions of systems, problems, solutions, and instruments such as, the System of Inventive Standard Solutions, Pointers to Physical, Chemical, Geometrical Effects and ARIZ (Algorithm of Inventive Problem Solving) – the main instrument of Classical TRIZ for atypical problems (Cascini, 2012). In the field of marketing management, the application of TRIZ is just beginning to emerge, thus difficulties in using this method appear (Richir et al., 2010). However, the author of TRIZ points out that principles of guiding the thought process while solving technical tasks may be transferred to other areas and used to organize creative thought in relation to any area of human activity (Altshuller, 1975).

In this paper, the OTSM model of TRIZ contradiction and the selected techniques and tools for contradiction modelling are analyses applied in the field of student self-marketing management. Creative problem solving is regarded as a power of talented people and a source of innovations (Nakagawa, 2011). But how to think creatively in problem solving, here in the field of self-marketing management, is still difficult to explain, teach and train, because the ways of thinking are not well structured. In TRIZ it is emphasized that, we must teach students to solve "tomorrow problems" to prepare them for life in a dynamically changing world. And here the key contradiction arises, since we cannot do it because we know nothing about the future world and about the problems they will deal with (Nesterenko, 2005). TRIZ methods are valuable in educating students and the educational results of their introduction in undergraduate programs appear very promising (Stratton et al., 2000). Several studies have been carried out to investigate and analyze the benefits of teaching TRIZ to students (Jani, 2013). The results show that TRIZ application improves the abilities of students to solve atypical problems, e.g., with the application of OTSM-TRIZ Games, creativity and mental abilities have improved (Cascini et al., 2015). TRIZ methodology might be a response to several problems, such as, the lack of innovation practice, the lack of students' awareness of innovation, and the lack of innovation tools for solving conflicts (Fan et al., 2012), which are also essential in the field of self-marketing

management. The research methodology applied in this paper is divided into three stages: 1) defining the system, 2) contradiction modelling, 3) generating solutions. First, the results of a survey are presented to observe and conceptualize the actual state of students' self-marketing. Second, the relations among the elements of students' self-marketing are recognized and the main contradictions are listed. Third, the students are involved in the research process and three unrelated problem-solving sessions in students' workshops are conducted with the application of selected TRIZ techniques and tools. The obtained results are compared and the potential of OTSM TRIZ Contradiction modelling's usability in students' self-marketing management is discussed.

2. RESEARCH METHODOLOGY

2.1. Define the system

The aim of the first stage is to observe and conceptualize the actual state of students' self-marketing. To achieve this, the survey method with an online questionnaire is proposed. In this, reference is made to the results of a survey conducted at the Corporate Management department of Poznan University of Technology. The main research aim of the survey was to get an understanding of the status of employment in the department and the labor market requirements. The survey was conducted among students of master's thesis studies (Jeenwal, 2020). Students were asked to rate their experience in the survey using a typical five-level scale (i.e., 1 – strongly disagree, 2 – disagree, 3 – neither agree nor disagree, 4 – agree, 5 – strongly agree). They were initially asked to provide rough data on the number of applications for a job or internship sent by them, the number of companies which responded to their application, the number of jobs or internships which students managed to finalize. Also, were asked to rate the skills requirements of the labor market and suggest the skills which are in high demand currently on the labor market. Each question of the survey provides information regarding the diversity and the approach of the student while searching for opportunities on the labor market. Also, a few questions intend to learn their experience and suggestions in the job search. The students were characterized according to the type of studies (bachelor's, master's), nationality, age, the field of professional experience (e.g., finance, accounting, human resources, engineering, hotel management, banking, and business process). The survey was conducted on the digital platform using Google Forms. A link to the questionnaire was forwarded to selected students (n = 31).

2.2. Contradiction modelling

A technical system, like a living organism, consists of interrelated parts. Improvements in one part of the system may have a negative effect on the other parts of the system, and that creates a contradiction. Making an inventive solution requires, first, to improve a single part or characteristic of the system without, two, impairing other parts or characteristics of the system or adjacent systems (Altshuller, 2004, p. 15). The second axiom of TRIZ postulates that technological systems evolve not randomly but they have to overcome contradictions. A contradiction must be overcome to get a breakthrough solution (Cavallucci, Rousselot, 2011; Cavallucci, Khomenko, Morel, 2005). There are three types of contradictions, i.e. (Altshuller, 1983, p. 32-35; Altshuller, 1996): 1) an administrative contradiction, which occurs from the very fact of the creation of an inventive task: something must be done, but how to do it is unknown, 2) technical contradiction, which occurs when changing one part of the system may have a negative effect on the other parts of the system, 3) physical contradiction, which occurs when one and the same part of the system is required to meet conflicting requirements. In the physical contradiction, the clash of the conflicting requirements is particularly pronounced. Therefore, the physical contradictions seem absurd and completely insurmountable at first glance. The TRIZ body of knowledge proposes the tools, methods, and knowledge base which are used to solve the identified problem of the conflicting elements. This study applies the ENV model (Element, Name of the property, Value of the property), which is a universal model adopted in OTSM-TRIZ for representing any kind of problematic situation (Cascini, 2012). The model distinguishes parameters in the following classes (Khomenko et al., 2007):

- Control Parameters (CPs): parameters that can be influenced, modified by the designer to obtain a specific outcome;
- Evaluation Parameters (EPs): describe the positive or negative implications of the choice of the designer.

The OTSM model of TRIZ contradiction includes both types of contradictions – technical and physical, and is presented in figure 1.

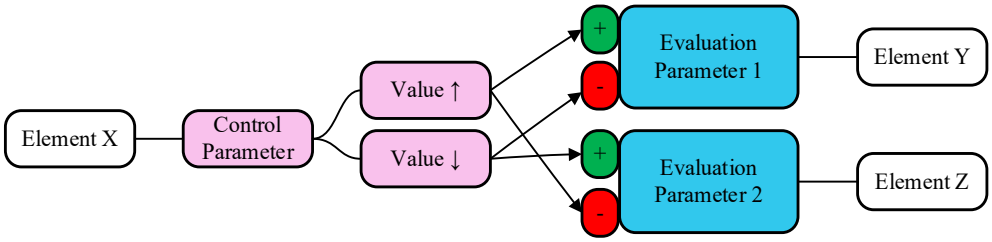

Fig. 1. The life OTSM model of TRIZ contradictions (Khomenko et al., 2007; Cascini, 2012)

In real life when people face contradictory situations, i.e., where one solution needs to be selected at the expense of the feature of another solution, without TRIZ, it is assumed that both solutions cannot co-exist (Gadd, 2016). It is believed that the two features are inevitably linked, i.e., when one is improved the other will inevitably get worse in some way. It is always worth thinking about home and work situations to see if a contradiction is solved or a compromise is accepted. The height of chairs, desks, kitchen worktops are all set at the same height for people of different shapes and sizes – a compromise and probably unsuitable for most individual needs – but accepted by people without noticing – as with many everyday objects (Gadd, 2016). Technical contradictions appear when we think of a solution to improve something but something else gets worse. Conventional thinking makes us assume that we must choose one and forgo the other, except that when we get a good thing it comes at the expense or loss of another benefit. TRIZ shows how to avoid compromise and have both benefits by applying the relevant 40 Principles of TRIZ (Gadd, 2016). Physical contradictions mean that we want opposite solutions. Increasing the value of a selected parameter has a positive impact on one set of requirements, but at the same time, a negative impact on the other set of requirements. To deal with the physical contradiction, the Separation Principles of TRIZ are used.

2.3. Generate solutions

The present study considers the possibilities to generate solutions to selected contradiction problems in students' self-marketing management during three unrelated sessions of students' workshops. Master's degree students of the Faculty of Engineering Management (specialization in Corporate Management), with no previous experience in TRIZ, participated in workshops sessions. Ten students were assigned to each workshop session. A diverse procedure for contradiction analysis is formulated for each session and is presented in table 1.

Table 1. Contradiction analysis procedures

Steps of the procedure / Workshop sessions	I Session	II Session	III Session
Identify the Operational Zone	included	included	included
Identify the Operational Time	included	included	included
Intensify the Contradiction	included	included	included
Search for inspiration (rely on actual experience and knowledge)	included	not included	not included
Apply the selected Inventive Principles	not included	included	not included

tab. 1 cont.

Steps of the procedure / Workshop sessions	I Session	II Session	III Session
Analyze the Separation Principles (in Time, in Space, on Condition)	not included	not included	included
Propose the solution	included	included	included
Compare the solution	included	included	included
Select the solution which should be applied	included	included	included

Source: own elaboration based on Yan et al., 2014; Cascini, 2012; Altshuller, 1956.

The workshops were conducted online. The selected contradiction which emerged in students' self-marketing management was introduced. The procedure for contradiction analysis was presented and clarified. An abridged form of the information which was provided to workshop participants is presented in table 2.

Table 2. The contradiction analysis procedures: a brief comparison of the results obtained by all three groups

Selected steps of contradiction analysis	Information provided to the participants
Identify the Operational Zone	In the simplest case the Operational Zone is the space where the conflict indicated in the Problem Model appears.
Identify the Operational Time	The operational time is when the available time resources appear: the time when conflict occurs (T1) and the time before the conflict (T2). A conflict can usually be eliminated (prevented) during T2. T3 is the time after a conflict, the actions are directed at the elimination of the disadvantages.
Intensify the Contradiction	Intensify the conflict by indicating the extreme state (action) of the elements.
Apply the selected Inventive Principles	The technical contradiction algorithm (i.e., Specific Problem, Generic Problem, Generic Solution, Specific Solution) is presented with examples (application of the 1st Principle of Segmentation). Information about the 39 Technical Parameters and the Contradiction Matrix is excluded. A defined and clarified list of 40 Principles is provided.

tab. 2 cont.

Selected steps of contradiction analysis	Information provided to the participants
Analyze the Separation Principles (in Time, in Space, on Condition)	How to achieve opposite requirements. Separate in Time (one solution at one time, the opposite solution at another), separate in Space (one solution in one space, the opposite solution at another), Separate in Condition (opposite solutions in the same place and at the same time; one solution for one element – the opposite for another). Three examples are provided for each of the above-mentioned Separation Principles. Information about the Separate by System Principle is excluded.

Source: own elaboration based on Cascini, 2012; Altshuller, 1956; Rantanen, Domb, 2010; Gadd, 2011; Silverstein, DeCarlo, Slocum, 2008.

The students were asked to apply the procedure of contradiction analysis, i.e., to generate and compare their solutions and to select final solutions. The main objective of the students' workshops is to investigate how students with no prior TRIZ experience are influenced by the different techniques and tools of inventive problem solving. The authors of this paper emphasize that in order to introduce the selected methods and tools of TRIZ and prepare non-experienced participants to apply them, the time for teaching and practice should be extended, e.g., to 28 hours (14 hours of theory, and 14 hours of project), in order to introduce the concept of problem solving using contradiction modelling (Cavallucci et al., 2011) and 80 academic hours of preliminary study in order to introduce ARIZ (Altshuller, 1956). Nakagawa (2011, 2012) proposes teaching under-graduate students how to think creatively in problem solving basing on TRIZ methodology.

3. RESULTS

3.1. The concept of student self-marketing

In the survey, students of the Engineering Management department were asked about the type of internships or jobs they were targeting. Usually, before completing their education, students try to gain work experience by means of part-time or full-time jobs. Due to the busy schedule of the students at the university, full-time jobs are not as feasible as part-time jobs. However, during breaks between the semesters

or years, it is possible to work full time. Most of the students (67.7%) were looking for full-time opportunities. Some of the students were looking for part-time opportunities (25.8%), and most of them came from bachelor's programs. 6.5% of the students were looking for job opportunities for weekends only, to maintain their academic schedule. Students were asked about the number of applications sent to find opportunities in the labor market. The idea behind this question was to find out what is the quantitative approach of students. Spending more time on a specific job in preparing a resume, cover letter, etc., and limiting the number of applications versus sending as many applications as possible to cover a maximum number of job opportunities. Focusing on one opportunity at a time can increase one's chances of selection, but also, there are chances of missing other coinciding opportunities. The results of the survey show that 41.9% of the students sent more than 30 applications to increase their chances. And 22.6% of the students were very selective and sent less than 10 applications. Students were asked about the number of applications they sent to find unpaid internship opportunities. There are a lot of opportunities available for unpaid internships in different fields as it is cost effective for the companies and by applying for unpaid opportunities, students increase their total number of applications, which means a higher probability of getting selected. Among the number of applications sent for unpaid internships from students of the Engineering Management department in Poznan University of Technology, more than half of the students (54.8%) turned down unpaid opportunities. However, 45.2% of the students showed that they give priority to opportunity rather than financial benefits. Students were asked about the number of calls for interviews they received for internships or jobs in 2019. Their answer let us determine whether it was justified to spend more time preparing for a specific job interview or this factor is not that important and does not lead to more interview calls. This is the initial stage of self-marketing and a gateway to achieving a job opportunity. During the job search in the labor market, 25.8% of the students received 1 interview call, 29% received 2 interview calls, 9.7% received 3 calls and 9.7% received 4 calls, respectively. And 12.9% of the students received more than 4 calls for interviews. But 12.9% of the students participating in the survey did not receive any calls for interviews. Students were asked about the number of internships or jobs offered to students in 2019. Converting a job opportunity to a job offer required effective skills and competency in the job. In addition to that, effective communication and interpersonal skills were required. The lower the success rate, the more work is required in the above skills (if an individual possesses all the skills mentioned in the resume matching with the job description). Of the students, 61.3% received an internship or job opportunity on the labor market. However, the remaining 38.7% did not find any employment opportunities. Students were asked about the importance of their skills in their selection for an internship or job. It is important to know which skill played a crucial role in the success of the interview. Irrespective of the labor market demand, matching individual skills with

job requirements can determine the success of the job opportunity. Students who managed to get an opportunity on the labor market were asked to rate each skill such as technical, analytical, communication and language, on a five-point scale from 1 (lowest importance) to 5 (highest importance). Most of the students agreed with the fact that language (58.1%) and communication skills (41.9%) were more important to them than any other existing skills. Of the students, 58.1% gave language skills 4 or more points. Students were asked about their priorities while searching for job opportunities on the labor market. The main purpose of this question was to identify what are the factors which satisfy students in a job. They were given options such as a better salary, interesting work, job security, work location and other (in case students have other priorities). This was a multiple-answer question since it is understandable that students may have more than one priority. Around two-thirds (67.7%) of the students selected better salaries as financial stability matters a lot for sustaining a comfortable lifestyle. More than half (58.1%) of the students agree with the fact that an interesting job is important in keeping them motivated to work. The students who were able to find job opportunities were asked which skill is currently in high demand on the labor market according to their work experience. Labor market requirements have trends based on current developments in the industry, and requirements get very frequently updated. The sole purpose of this question was to identify current trends in the labor market so that students can prepare themselves for upcoming opportunities. The demand for skills was recognized based on interviews and various other recruitment processes. Here students could mention more than one skill which they believed is in demand. Among students of corporate management, 53.8% observed that knowledge of the regional language is especially important in finding a job, and 34.6% of the students believed that software skills are also in high demand. Communication skills were the third most important skill in demand (23.1%) according to the students.

The selected results of the survey are presented and discussed with the aim to assess the students' approach to self-marketing and their activities in the labor market. The obtained results are used to model the actual state of the students self-marketing, study the relations between its components and to identify emerging contradictions in students' self-marketing management.

3.2. Findings on contradictions

It was noticed that there is no pattern among the students regarding the number of applications: some sent less than 10 applications while some sent more than 30 applications. Students are not clear which approach they should adopt when they

send out job applications. One approach is sending out as many as possible applications as higher quantity may lead to higher probability of a job. Another approach is to apply for a selected job opportunity, but spend more time to adjust each application for that specific job opportunity, to increase the strength of the application. Students were not sure which skills will play an important role for them in finding a job opportunity on the labor market. There is a lack of clarity among the students in terms of skills and content which they should mention or not mention in the resume. There is uncertainty about the standard resume size and content. As a resume is the first object which represents a student in the labor market in the process of job screening, its content and attention-grabbing characteristics are very crucial. Another doubt among the students is about their priorities regarding job opportunities as not all jobs provide similar work situations and benefits. Some students give priority to money by compromising on the factor of interesting work, while some students give priority to work location over interesting work. The students assume that they must compromise some benefits in order to gain other benefits and not all the benefits can coexist in the same system. Out of all these problems with contradicting characteristics, the contradiction over the length of the resume was selected for further analysis. It was selected because the resume was the most relevant and widely used instrument in finding a place on the labor market. And since all the students were familiar with these contradictions, there was a higher probability of arriving at important conclusions. The contradiction which occurs most frequently in the job search is that many individuals are confused regarding the length of their curriculum vitae. According to the different perspectives of various Human Resources employees across the globe, they are still not able to arrive at any concrete conclusions. There is no specific size, length, or format of a CV. Although a CV provides a good overview of the personal credentials of any individual during a job search, many human resource individuals have said in the past that a lengthy CV is very often unattractive. In any lengthy CV, all the necessary information is provided, but it is not necessarily relevant to the job requirement. Similarly, when people present a short resume to make it more attractive and eye-catching for human resources, sometimes they forget to mention essential information which can be an advantage in their selection for that job role.

3.3. Comparative analysis of problem-solving outcomes

After the workshop session, the participants were asked to work on the contradiction related to the appropriate length of a CV and submit their results. The task was not obligatory, and was intended to let students practice the skills and familiarize themselves with new sets of techniques and tools. The results of the contradiction

analysis were prepared by 36% of Session I participants, 27% of Session II participants, and 30% of Session III participants. The selected concepts proposed in the collected results are presented below.

The first group identified the operational zone as the University, and the other two groups identified the Labor Market as the operational zone. All groups identified operational time T1 as the preparation time part where students plan and write their CV. Operational time T2 was identified as the functional stage where students analyze their CV and forward it to employers on the labor market. And operational time T3 was identified as the revision period where students reorganize their CV based on the feedback received from the labor market. All students exaggerate the contradiction by expecting CV rejection and unemployment. All groups proposed interesting solutions to the contradictions by using different methods and tools.

Session I students relied on their personal experience and knowledge. They were more focused on adapting the ideal CV from the labor market, rather than thinking of something new. As useful tools and methods they indicated searching for and choosing a CV template, discussion with friends from HR departments and taking

Table 3. A brief comparison of the results obtained by all three sessions

Workshop sessions tasks	Session I	Session II	Session III
Identify the Operational Zone	University	Labor market	Labor market
Identify the Operational Time: T1	Planning CV	Writing CV	Writing CV
Identify the Operational Time: T2	Analyzing CV	Sending CV	Analyzing CV
Identify the Operational Time: T3	Revising CV	Revising CV	Revising CV
Exaggerate the Contradiction	CV rejection	CV rejection	Unemployment
Proposed solutions from the students	CV templates, personal experience HR advice, colleagues' experiences	Reorganizing CV to the demands of the situation, customizing CV	Customizing CV according to the job requirement
Results comparison: the applied Inventive Principle	26 Copying	20 Continuity of Useful Action; 5 Merging/Consolidation	33 Local Quality; 17 Another Dimension; 10 Prior Action

Source: own elaboration.

their advice, comparing resumes with associates in similar positions and drawing conclusions from their experience. It is safe to say that their approach was a traditional way of solving a contradiction. Whenever a student tries to prepare a CV, a reference is required to get the basic idea of the CV format. Taking suggestions from the experts and professionals of the industry is again a very safe approach and involves minimum risk. The risk factor is especially important as usually students do not get many opportunities for the same job. Reducing the experimental part and standardizing increases the probability of being a fit for the requirements. But this solution takes away the USP (unique selling point) from the CV as it is a regular CV, and without extraordinary content, it is hard to stand out in the crowd.

Session II students who were supposed to use the Separation Principles to solve the problem, were more focused on reorganizing the CV according to the demands of the situation. According to the group, a comprehensive CV is only required by an organization in urgent need. In other scenarios, a well elaborated CV can be forwarded to the organization. Also, they suggested that it is important to understand the expectations of the industry from the CV as different work positions have different forms of CV. Thus, customizing a CV separately for each industry. This group was mainly focused on revising the CV based on the situation. They gave priority to present requirements in preparing a CV rather than focusing on the standards learnt from experience. This group realized that the contradiction could have different solutions depending on the area of interest. Although the idea of customization remains the same in all the proposed solutions, it is implemented based on urgency, work position and requirement.

Session III students used the selected Inventive Principles and suggested that it is better to avoid any irrelevant information in the CV and customize according to the job requirement. They thought that it would be helpful as merging sections will save a lot of space in the CV. An interesting solution which came to mind after using the principle of moving into another dimension was, in addition to a CV, that it is a good idea to create a short video of a minute or two with a brief description. Another suggestion, adding keywords which are suitable for the target job industry, was based on the principle of prior action. Solutions provided here were significantly different from the other two groups as they had more creative approaches. Instead of following the conventional methods for solving the contradiction, they preferred to think out of the box and suggested solutions which are quite rare. Customization of the CV was based on the important skills required by the labor market to make it more effective and straight to the point to enhance the chances of getting selected. However, creative solutions, unless fully verified, can be risky as they are an approach that can be embraced or entirely rejected by the industries. The results of the three workshop sessions were compared with reference to the Inventive Principles, which produced the proposed solutions. In the first session, where an analysis of the Operational Zone (OZ), the Operational Time (OT) and intense contradiction is applied, the application

of the 26th Inventive Principle, i.e., Copying, is indicated. In the second session, where ideas are generated also including an analysis of the Principles of Separation (Time, Place, Condition), the Inventive Principles 20. Continuity of Useful Action and 5. Merging/Consolidation are applied. In the third session, where ideas are generated with reference to the list of TRIZ Inventive Principles, the application of three Inventive Principles, i.e., 33. Local Quality; 17. Another Dimension; 10. Prior Action is indicated. Thus, the authors noticed that with the increase of information about TRIZ tools provided to students, came an increase in the number of proposed solutions. The results of this study are the first step towards further analysis of the possibilities to apply selected TRIZ methods and tools to increase students' (with no previous experience with TRIZ) creativity in the field of self-marketing management.

4. CONCLUSION

The aim of this paper was to analyze student self-marketing and to improve methods of student self-marketing management. The main determinants of students' self-marketing were defined based on a literature review. The actual state of student self-marketing was assessed by performing a survey among Poznan University of Technology, Engineering Department students. Based on survey results, several contradictions were identified. The OTSM model for TRIZ contradiction assessed the contradiction regarding the length of a CV. During the three workshop sessions, it was analyzed how students, with no previous experience with TRIZ, applied selected and simplified TRIZ tools in a problem-solving situation. However, it is understandable that one hour is a short time to introduce students to an entirely new concept as it is difficult to explain the conceptual theory of TRIZ briefly. However, despite the fact that the students were using the method for the first time after a short introduction, the results were quite interesting. In terms of identifying the operational zone and operational time, all three groups provided pretty much the same results. And it makes sense, as all three groups were provided with the same situation and the adaptation of TRIZ has no influence in characterizing the problem. However, a clear influence of the workshop was visible in the solutions proposed by the students. Even with a brief introduction to TRIZ principles, differences in the approach of students can be clearly noticed. In the Algorithm of Inventive Problem Solving (ARIZ85C – a meta-method using most of the basic TRIZ instruments) nine parts of the inventive process are distinguished, such as, 1) analyzing the problem, 2) analyzing the problem model, 3) defining the ideal final results (IFR) and physical contradictions, 4) mobilizing and using substance-field resources, 5) applying the knowledge base, 6) changing or substituting the

problem, 7) analyzing the method of resolving the physical contradiction, 8) applying the obtained solution, and 9) analyzing the problem solving process. In this paper the students were involved in analyzing the method of resolving the contradiction (part 7). To understand the TRIZ creative thinking method in the problem solving process as part of an undergraduate education, a combination of a one-semester lecture course of the methodology, a one-year seminar class for group practices, and a one-year seminar class for thesis work has been found effective and necessary (Nakagawa, 2011). The aim of future research is to apply the other parts of the Algorithm of Inventive Problem Solving and to extend the dedicated teaching hours to improve the problem-solving process in the field of management science.

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MODEL SPRZECZNOŚCI OTSM TRIZ W ZARZĄDZANIU MARKETINGIEM OSOBISTYM STUDENTÓW

Streszczenie

Celem pracy jest analiza i doskonalenie metod zarządzania marketingiem osobistym studentów. Scharakteryzowano istotę marketingu osobistego studentów rozpatrywaną w kontekście aktywności podejmowanych przez nich na rynku pracy. Odwołując się do analizy literatury, wskazano możliwość zastosowania modelu sprzeczności OSTM TRIZ w zarządzaniu marketingiem osobistym studentów. Przedstawiono wyniki badań ankietowych dotyczących aktywności marketingu osobistego podejmowanych przez wybraną grupę studentów Politechniki Poznańskiej. Zidentyfikowano zbiór problemów i występujących sprzeczności w zarządzaniu marketingiem osobistym studentów. Zestawiono zbiór technik i narzędzi stosowanych w rozwiązywaniu problemów sprzeczności w ramach algorytmu ARIZ-85. Przeprowadzono trzy niezależne sesje warsztatów ze studentami, którzy nie mieli wcześniej żadnych doświadczeń z metodologią TRIZ, w celu sprawdzenia możliwości stosowania określonych technik i narzędzi TRIZ w rozwiązywaniu problemów sprzeczności w marketingu osobistym. W pierwszej sesji zastosowano metodę określania miejsca (OZ) i czasu (OT) występowania sprzeczności oraz ich intensyfikacji. W drugiej sesji dodatkowo wprowadzono metodę analizy zasad oddzielania sprzeczności (w czasie, w przestrzeni i w zależności od okoliczności), a w trzeciej zbiór zasad wynalazczych TRIZ. Wyniki wypracowane przez studentów w każdej z trzech sesji warsztatów zostały ocenione oraz porównane. W rezultacie wskazano na zasadność zastosowania modelowania OSTM TRIZ i jego użyteczność w rozwiązywaniu problemów sprzeczności w zarządzaniu marketingiem osobistym studentów.

Słowa kluczowe: zarządzanie marketingiem, TRIZ, model sprzeczności, marketing osobisty