

Study of the Influence of Academic Success on the Choice of Professional Specialty

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Abstract

The aim of the research presented in this paper was to identify the relation of mechanical engineering students' individual motives and their choice of specialty to success in their studies. The research includes consideration of motivational factors from a number of aspects. The results suggest a connection between academic success and the motives of professional advancement, success in the profession, achieving perceptible success at work, opportunities for hierarchical advancement in a company and others. In accordance with the expressed motives, the results highlight the importance of individual specialties for students depending on the success achieved in the course of their studies.

Key words: *career orientation; engineering education; motives*

Introduction

Motivational aspects nowadays have an important role in the analysis of behaviour. Many authors point out their importance comparing them with the driving forces of human activities. Chulef, Read and Walsh (2001, p.191) point out: "Goals are fundamental to human behaviour, they play a central role in both its enactment and its understanding". Deci & Ryan (2000, p. 227) highlight: "Most contemporary theories of motivation assume that people will initiate and persist at behaviours to the extent that they believe particular behaviours will lead to desired outcomes or goals". Friedman & Foerster (2005, p. 263) emphasize: "In recent years, affective scientists have increasingly sought to elucidate the link between emotion and attention".

Research of motives has been accessed from various aspects by different authors:

- hierarchical taxonomy of human motives (Read et al., 2010),
- taxonomy of situations (Ellemers, Spears, Doosje, 2002),

- self-determination theory as a theory of work motivation (Gagne & Deci, 2005),
- a theoretical model relating to motivations, participation, and performance (Roberts , Hann, Slaughter, 2006),
- understanding social preferences (Charness & Rabin, 2002) and other.

In this sense, theories of professional orientation have been developed on the bases of motivational models, “minimizing negative emotion, and maximizing justifiability of a decision” (Sauermann, 2005, p. 273). It can be concluded that “important individual factors that help form the psychological contract are the career stage of an individual and the individual’s personal career anchor or orientation” (Agarwal & Ferratt, 2000, p. 158).

A general division of motivational theories is shown in Figure 1.

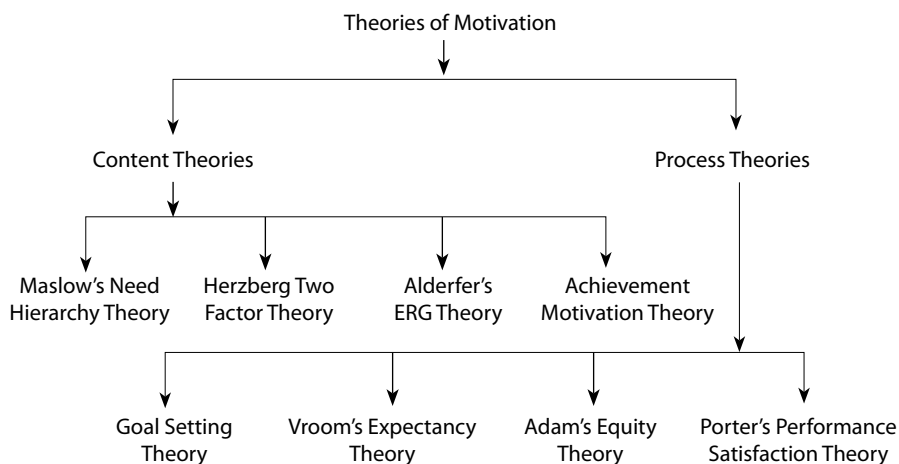


Figure 1. Theories of Motivation (Singh, 2011, p. 137)

Analysing motivational theories, Singh (2011, p. 137) concludes: “Process theory interprets the underlying process of motivation. Its major focus is on the dynamics of the manner in which the variables are interrelated in explaining the direction, degree and persistence of efforts. They explain the individual’s behaviour in terms of job satisfaction related to perceived rewards or lack of rewards that initiates behaviour“. In this sense, Lussier & Achua (2010, p. 87) highlight: “Process motivational theories are more complex than content motivational theories. Content motivational theories simply focus on identifying and understanding people’s needs. Multilevel motivational theories go a step further, attempting to understand why people have different needs, why they need a change, how and why people choose to try to satisfy their needs in different ways, the mental process people go through, how they understand situations, and how they evaluate their need situation.“

Many authors have introduced the term engineering identity (Tonso, 2006). Forr, Walden and Trytten (2007, p. 103) emphasize: “Engineers need a breadth of experience to enrich the gene pool of ideas from which elegant engineering solutions, called ‘individual diversity’ can be drawn”.

It is undisputed that creativity requires a high level of motivation. Eisenberg & Shanock (2003, p. 121) highlight that “Creative motivational orientation, enhanced by rewards, strongly affects innovative performance”. Consequently, Guiri et al. (2007, p. 1107) provide “new information about the characteristics of European inventors, the sources of their knowledge, the importance of formal and informal collaborations, the motivations to invent”. The influence of motives on the characteristics of the innovation process can have different aspects. Sauermann & Cohen (2010, p. 2134) highlight: “Although hours worked (quantity of effort) have a strong positive effect on performance, motives appear to affect innovative performance primarily via other dimensions of effort (character of effort).” In this sense it is necessary for educational institutions to devote considerable attention to this matter (Bannerot, 2009).

Ratings of academic success and knowledge are important factors when choosing the professional specialty. Since students are aware of their knowledge and success in studying, it can be expected that they will choose the specialties which they believe will enable them to achieve greater success. In this paper, research of motives for choosing a particular specialty was carried out from different aspects: personal, social and existential. Ryan & Deci (2000, p. 54) point out: “People have not only different amounts, but also different kinds of motivation. That is, they vary not only in level of motivation (i.e., how much motivation), but also in the orientation of that motivation (i.e., what type of motivation)”.

The analysis of results was based on the success students achieved in the course of their studies. It may be expected that the students’ success in the field of engineering is substantially associated with motivational factors. Ohland et al. (2008, p. 259) emphasize: “Our findings highlight the potential of making the study of engineering more attractive to qualified students”.

The primary research aim in this paper, research of recently graduated mechanical engineers’ motives for choosing their specialty, is divided into more specific objectives and research tasks. The individual objectives (areas under research) are: determining the motives and the students’ choice of specialty from the aspect of the difference in academic success.

Starting point of the research is the hypothesis that students with better academic results will exhibit higher motivation towards:

- a. opportunities for professional advancement,
- b. opportunities for hierarchical advancement in a company,
- c. success in profession,
- d. love for the profession,
- e. achieving perceptible success at work.

This hypothesis was formed on the basis of the assumption that academic achievement is related to people’s choice of interests and that people like occupations for which they are skilled and which enable them to achieve success. This paper also

includes the analysis of other students' motives in terms of professional orientation. These motives cover different aspects: orientation towards the vocation, social aspects and working conditions. In addition to the research of motives, students' choice of individual specialties in mechanical engineering was analysed.

Materials and Methods

The research included a survey which was conducted with the final year university students of Mechanical Engineering, as well as graduates. The questionnaire determined the significance of individual motives and preference for a particular specialty. Questions in the survey were short, clear and unambiguous. Answers to the questions which imply wider acceptance and greater preference are indicated by larger numbers, whereas the questions implying limited acceptance or a lower inclination are indicated by smaller numbers. The total score was determined by a statistical analysis of the responses.

During the formulation of the questions and the construction of the questionnaire, several requirements were considered:

1. The form of the survey. The purpose of the testing was given in the header of the questionnaire. The questions were designed to elicit clear and simple answers.
2. Types of questions in the survey. The questions were divided into three groups: determining motives, preference for a particular specialty, and finally, personal data.

The structure of the participants at the time of the survey was as follows:

- students in the ninth semester: 12 (48%),
- graduates: 13 (52%).

The total number of the participants was 25.

The number of students according to average grade:

- students with average grade between 6 and 7 - 11,
- students with average grade between 7 and 8 - 10,
- students with average grade between 8 and 9 - 4.

The basic elements of the questionnaire are presented in Table 1.

Table 1. Basic elements of the questionnaire

Determining the importance of individual motives for professional work			Determining the orientation towards particular specialties	
No.	Motive	Answer	Specialty	Answer
	Personal income		Product design	
	Opportunities for professional advancement		Technology design	
	Opportunities for hierarchical advancement within a company		Working in the immediate production process	
	Success in the profession		Quality control	

	More leisure time during the day		Maintenance of the work equipment	
	Profession with higher reputation in society		Department of supply	
	Good working conditions		Marketing, Sales department	
	Freedom to exercise one's rights		Operational production planning	
	Job stability		Scientific research	
	Obtaining recognition		Organization of the company	
	Easy job		Management	
	Taking advantage of various benefits		Working in a computer department	
	Love for the profession		Explanatory note. Enter the numbers 1, 2 or 3, depending on how much you are interested in a particular job: 1 - This job does not interest me at all 2 - This job interests me but not very much 3 - This job interests me the most.	
	Achieving perceptible success at work			
Explanatory note. Numbers 1, 2 or 3 mark the importance of individual motives: 1 - This motive does not interest me at all 2 - This motive interests me, but it is not of crucial importance 3 - This motive is of the greatest importance to me.				

The obtained results were statistically analysed and graphically presented. The arithmetic mean was calculated by the formula (1).

$$x = \frac{\sum_{i=1}^n k_i \cdot x_i}{N} \quad (1)$$

X_i – evaluation

K_i – number of results with the appropriate evaluation

N – total number of results

The results are presented in the form of arithmetic means of individual results and grouped according to the category of academic success (Tables 2-4).

Results and Discussion

The results of the present research show that more successful students demonstrate higher motivation with respect to the opportunities for professional advancement, opportunities for hierarchical advancement within a company, success in the profession, achieving perceptible success at work and love for the profession than the less successful students, which fully confirms the assumed hypothesis (Figure 2).

This is certainly a confirmation of the fact that academic success is significantly connected with the students' level of aspirations for the profession they have chosen. "Aspirations about the future play an important role in the construction of self-determination, with emerging adulthood as a period when individual aspirations go through the "reality check-up" (Negru, Subțirică, Oprea, 2011, p. 205). The overall academic success and the success in the courses relevant for a particular specialty and educational profile are connected with professional aspirations, as well as the orientation towards particular specialties. It is not unreasonable to take into

consideration the fact that the desire for achievement is, among others, an incentive for achieving higher academic success.

Table 2. The importance of individual motives and specialties for students with average grade between 6 and 7.

No.	Motive	Mean value	Specialty	Mean value
	Good working conditions	2.85	Technology design	2.3
	Job stability	2.85	Working in the immediate process of production	2.15
	Personal income	2.1	Scientific research	2
	More leisure time during the day	2.05	Marketing, Sales department	1.85
	Success in the profession	2	Product design	1.85
	Freedom to exercise one's rights	1.9	Management	1.6
	Love for the profession	1.85	Quality control	1.4
	Achieving perceptible success at work	1.8	Organization of the company	1.3
	Opportunities for professional advancement	1.8	Maintenance of the work equipment	1.3
	Taking advantage of various benefits	1.75	Operational production planning	1.15
	Easy job	1.75	Working in a computer department	1
	Profession with higher reputation in society	1.35	Department of supply	1
	Opportunities for hierarchical advancement within a company	0.95		
	Obtaining recognition	0.9		

On the basis of everything considered, greater tendency of more successful students towards achieving better advancement in a company hierarchy can be assumed. Naturally, not all individuals obtain the necessary skills required for successful management of a group, but most of the analysed qualities of successful students suggest that they would achieve more success in management, as well as showing affinity for a leadership role. Research results in this study suggest that academic success is associated with the affinity towards hierarchical advancement within a company.

Table 3. The importance of individual motives and specialties for students with average grade between 7 and 8.

No.	Motive	Mean value	Specialty	Mean value
	Job stability	3	Marketing, Sales department	2.5
	Personal income	2.65	Working in a computer department	2.2
	Good working conditions	2.5	Management	2
	Opportunities for professional advancement	2	Technology design	2
	Love for the profession	2	Organization of the company	1.9
	Success in the profession	1.9	Product design	1.9
	Achieving perceptible success at work	1.9	Scientific research	1.9
	Freedom to exercise one's rights	1.85	Operational production planning	1.75
	More leisure time during the day	1.75	Department of supply	1.55
	Profession with higher reputation in society	1.75	Quality control	1.55
	Easy job	1.45	Working in the immediate process of production	0.95

	Taking advantage of various benefits	1.2	Maintenance of the work equipment	0.95
	Opportunities for hierarchical advancement within a company	0.95		
	Obtaining recognition	0.7		

Table 4. The importance of individual motives and specialties for students with average grade between 8 and 9

No.	Motive	Mean value	Specialty	Mean value
	Success in the profession	3	Scientific research	3
	Achieving perceptible success at work	2.85	Organization of the company	2.45
	Opportunities for professional advancement	2.85	Operational production planning	2.45
	Good working conditions	2.85	Marketing, Sales department	2.45
	Job stability	2.5	Working in a computer department	2.15
	Opportunities for hierarchical advancement within a company	2.5	Management	2
	Personal income	2.4	Product design	2
	Love for the profession	2.05	Working in the immediate process of production	1.25
	More leisure time during the day	1.65	Technology design	0.9
	Profession with higher reputation in society	1.65	Quality control	0.9
	Taking advantage of various benefits	1.65	Department of supply	0.8
	Freedom to exercise one's rights	1.65	Maintenance of the work equipment	0.1
	Easy job	0.95		
	Obtaining recognition	0.55		

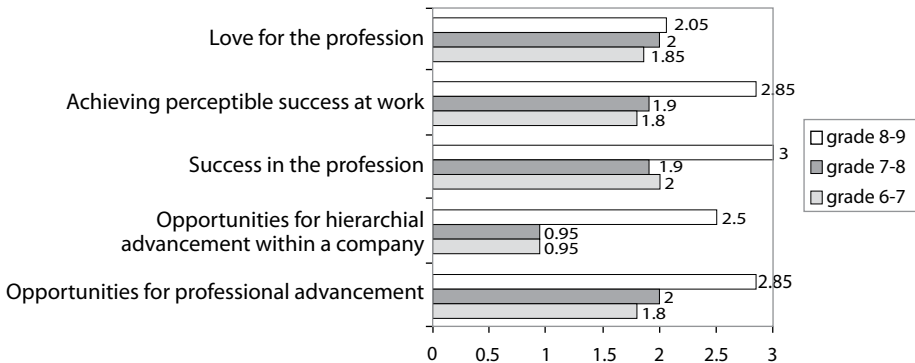


Figure 2. Higher intensities of the successful students' motives

The obtained data suggest that students with better academic results demonstrate less interest in the motives such as easy job and more leisure time during the day (Figure 3). This is certainly a confirmation that one of the main incentives for more successful students is success at work, but also self-actualization and creativity. It is undeniable that, for students, the success in achieving better learning outcomes is also connected with this motive. More successful students try to emphasize their abilities and preferences, as well as express all of their options. It is interesting that

these students attach somewhat less importance to obtaining recognition. The results indicate their greater orientation towards their skills and attaching less importance to social motives. It may be observed that this motive is the least expressed motive of the overall survey. This can be explained by a number of other influential factors affecting students' motivation. One of the most important factors is certainly lack of work experience, which significantly affects the formation of social compliance with the collective and the motives related to the acceptance of collective social values.

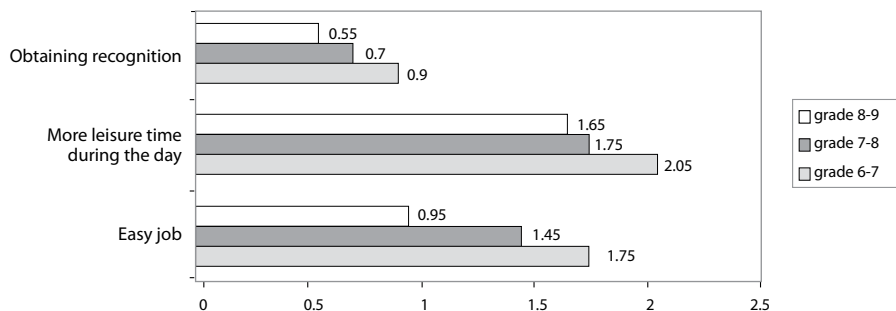


Figure 3. Lower intensities of the successful students' motives

Among social motives, the following ones can be singled out (Figure 4): profession with higher reputation in society, freedom to exercise one's rights and taking advantage of various benefits, which are generally less pronounced motives in the entire survey.

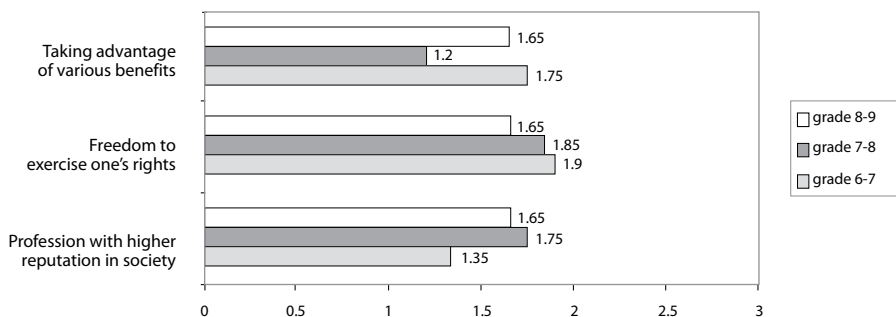


Figure 4. Less pronounced motives of the entire survey

The most important motives of the entire survey are personal income, good working conditions and job stability, regardless of the success which students have achieved during their studies (Figure 5). It can be concluded that these motives are not directly related to academic achievement, but result from other motivational aspects of social and economic nature.

The analysis of the preferences for particular specialties shows that students with higher academic achievement are more oriented towards scientific research, employment in a computer department, management, organization of the company, but less so towards employment in the immediate process of production, maintenance of the work equipment and quality control (Figure 6).

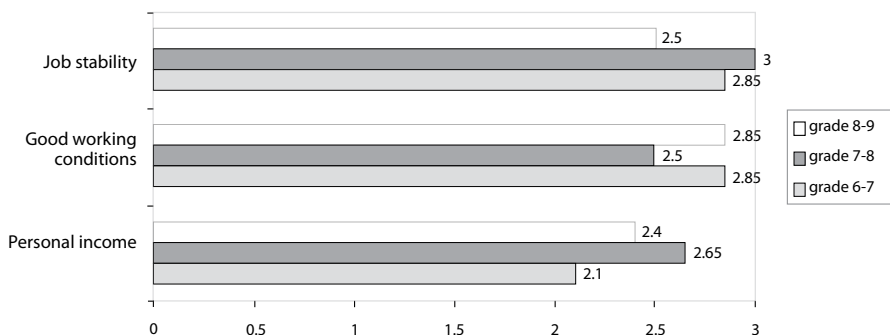


Figure 5. The most prominent motives of the entire survey

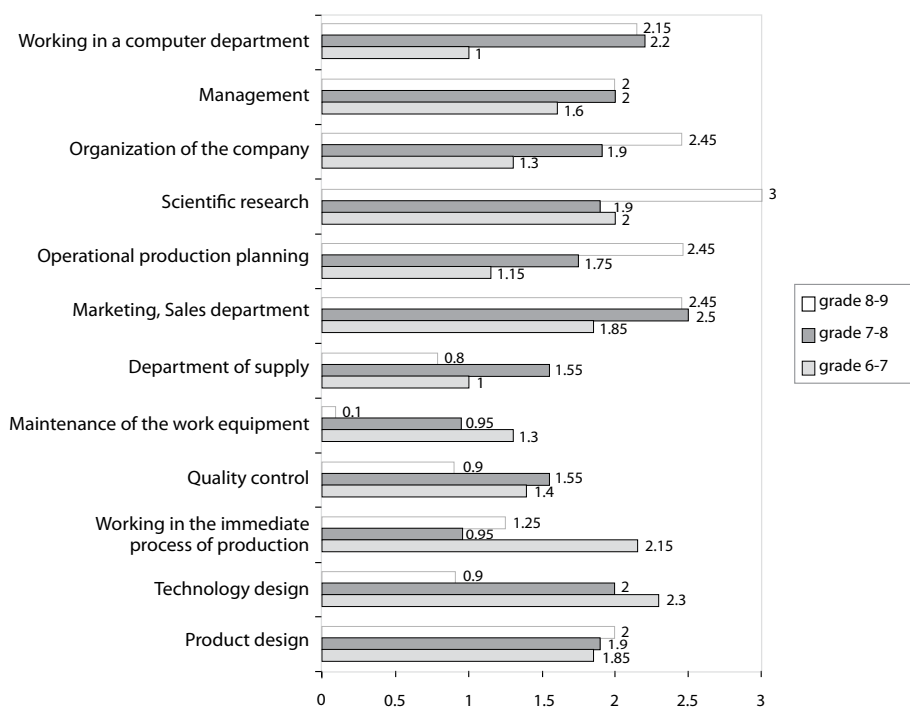


Figure 6. The importance of specialties as reported by all respondents

This orientation towards specialties can be attributed to the students' higher motivation towards opportunities for professional advancement as well as the advancement in a company hierarchy. It can be concluded that students find greater opportunities for the realization of their motives in these specialties. Naturally, it cannot be concluded that other specialties do not provide enough opportunities for achieving e.g. success in business or success in the profession. Most importantly, based on this analysis, students' attitudes towards certain specialties can be better understood.

Conclusion

The presented research indicates the need for students to be informed about the practical aspects of different specialties which graduated mechanical engineers can opt for. Such information has a positive influence on students regarding future choice of specialties, in accordance with their abilities, desires and interests. This increases students' motivation and provides an opportunity for graduated mechanical engineers to achieve greater success in their profession.

This issue must also be taken into consideration in the curricula at the universities. Based on the analysis of jobs, descriptions and ideas of occupations can be generated. There are numerous ways for the application of educational technology which can be used for this purpose. Kraebber & Lehman (2009, p. 276) highlight: "Faculty members in manufacturing education have high relative intensity of concern and awareness for new educational technologies along with strong concerns about the time and resources related to the use of educational technology in manufacturing education".

Numerous studies suggest the use of different methodologies and training materials for this purpose (Dogan, 2010; Ismajli, 2008; Lončarić, 2009). Tang & Austin (2009, p. 1241) report their research results: "Mean scores revealed that Video conveyed the highest amount of Enjoyment. PowerPoint provided the highest amount of Learning and Motivation. The Internet provided the highest Career Application for future jobs. Younger students preferred Video, whereas older students favoured Lecture. Regression results showed that the use of Video for Learning, Projector and Lecture for Enjoyment, PowerPoint for career and Motivation, and the Internet for Learning contributed to professors' teaching effectiveness".

The application of this information enables students to focus on those specialties that will be in accordance with their abilities, preferences, and personalities, while taking into account their opportunities. Professional visits to companies and professional practical experience also provide a more realistic insight into the role of engineers in the performance of individual specialties. Obviously, the information about employment opportunities, job stability, a variety of benefits, and the amount of personal income should not be omitted. Involvement in research projects also has great significance for the development of students' motivation and their choice of a particular specialty.

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Istraživanje utjecaja uspjeha na studiju na odabir stručne specijalizacije

Sažetak

Cilj je istraživanja prikazanog u ovom radu utvrditi povezanost između pojedinačnih motiva studenata strojarstva i njihovog odabira specijalizacije s obzirom na uspjeh u tijeku studija. Istraživanje uključuje razmatranje motivacijskih čimbenika s različitih gledišta. Rezultati upućuju na povezanost između uspjeha na studiju i motiva profesionalnog napredovanja, uspjeha u struci, postignuća vidljivog uspjeha na poslu, mogućnosti hijerarhijskog napredovanja u tvrtki i drugih. U skladu s izraženim motivima, rezultati upućuju na važnost pojedine specijalizacije za studente ovisno o postignutom uspjehu u tijeku studija.

Ključne riječi: motivi; obrazovanje inženjera; profesionalna orijentacija

Uvod

Motivacijski aspekti u današnje vrijeme imaju važnu ulogu u analizi ponašanja. Mnogi autori ističu njihovu važnost i uspoređuju ih s pokretačkom snagom ljudskih aktivnosti. Chulef, Read i Walsh (2001, str. 191) navode: „Ciljevi su temelj ljudskog ponašanja, predstavljaju središnju ulogu kako u njegovom provođenju tako i u njegovom razumijevanju”. Deci i Ryan (2000, str. 227) ističu: „Većina suvremenih teorija motivacije pretpostavlja da će ljudi inicirati i ustrajati na određenom ponašanju do te mjere da vjeruju da će ih ponašanje dovesti do željenih ishoda ili ciljeva”. Friedman i Foerster (2005, str. 263) naglašavaju: „Posljednjih godina, znanstvenici koji se bave afektivnom znanošću pokušavaju u sve većoj mjeri rasvijetliti vezu između emocija i pažnje”.

Različiti autori pristupaju istraživanju motiva s različitih gledišta:

- hijerarhijska taksonomija ljudskih motiva (Read i sur., 2010)
- taksonomija situacija (Ellemers, Spears, Doosje, 2002)
- teorija samoodređenja kao teorija radne motivacije (Gagne i 2005)

- teorijski model koji se odnosi na motivaciju, sudjelovanje i izvedbu (Roberts, Hann, Slaughter, 2006)
- razumijevanje društvenih preferencija (Charness, Rabin, 2002) i drugi.

U tom smislu, teorije profesionalne orijentacije razvijene su na temelju motivacijskih modela, „minimizirajući negativne emocije i maksimizirajući opravdanost odluke” (Sauermaun, 2005, str. 273). Može se zaključiti da „su važni individualni čimbenici koji pomažu oblikovati psihološki ugovor faza u karijeri pojedinca i polazište ili usmjerenje za njegovu/njezinu osobnu karijeru” (Agarwal, Ferratt, 2000, str. 158).

Opća podjela motivacijskih teorija prikazana je na Slici 1.

Slika 1.

Analizirajući motivacijske teorije, Singh (2011, str. 137) zaključuje: „Procesna teorija tumači temeljni proces motivacije. Glavni naglasak teorije je na dinamici međusobne povezanosti varijabli pri objašnjavanju smjera, stupnja i ustrajnosti napora. Oni objašnjavaju ponašanje pojedinca s obzirom na zadovoljstvo poslom i povezani su s percipiranim nagradama ili nedostatkom nagrada koje iniciraju ponašanje”. U tom smislu, Lussier i Achua (2010, str. 87) naglašavaju: „Procesne teorije motivacije složenije su od sadržajnih teorija motivacije. Sadržajne teorije motivacije jednostavno se usredotočuju na identificiranje i razumijevanje ljudskih potreba. Višerazinske teorije motivacije idu korak dalje tako što pokušavaju shvatiti zašto ljudi imaju različite potrebe, zašto se njihove potrebe mijenjaju, kako i zašto ljudi odlučuju pokušati zadovoljiti potrebe na različite načine, koji su to mentalni procesi kroz koje ljudi prolaze, kako razumiju situacije i kako procjenjuju svoju situaciju potreba.“

Mnogi su autori uveli pojam identiteta inženjera (Tonso, 2006). Forr, Walden i Trytten (2007, str. 103) ističu: „Inženjeri trebaju širinu iskustva kako bi obogatili temeljna iskustva i ideje pomoću kojih se mogu pronaći elegantna rješenja vezana uz inženjerstvo, pod nazivom ‘individualna raznolikost’”

Nesporno je da kreativnost zahtijeva visoku razinu motivacije. Eisenberg i Shanock (2003, str. 121) naglašavaju da „kreativna motivacijska orijentacija, pojačana nagradama, snažno utječe na inovativnu izvedbu”. Stoga, Guiri i sur. (2007, str. 1107) daju “nove informacije o karakteristikama europskih izumitelja, izvorima njihova znanja, važnosti formalne i neformalne suradnje, motivacije za inovativnost”. Utjecaj motiva na karakteristike procesa inovacije može imati različite aspekte. Sauermaun i Cohen (2010, str. 2134) ističu: „Iako odrađeni sati (količina truda) imaju snažan pozitivan učinak na izvedbu, čini se da motivi utječu na inovativnu izvedbu prvenstveno preko drugih dimenzija truda (karakter napora).” U tom smislu, neophodno je da obrazovne institucije posvete značajnu pozornost ovom pitanju (Bannerot, 2009).

Ocjene tijekom studija i znanja važni su čimbenici pri odabiru stručne specijalizacije. Budući da su studenti svjesni svog znanja i uspjeha u studiju, može se očekivati da će oni izabrali specijalizaciju za koju vjeruju da će im omogućiti postizanje većeg uspjeha. U ovom radu, istraživanje motivacije za odabir određene specijalizacije provedeno je

s različitim aspektata: osobnog, društvenog i egzistencijalnog. Ryan i Deci (2000, str. 54) navode: „Ljudi imaju ne samo različite količine, već i različite vrste motivacije. To jest, oni se razlikuju ne samo prema stupnju motivacije (tj. koliko su motivirani), već i u orijentaciji te motivacije (tj. koju vrstu motivacije posjeduju)“.

Analiza rezultata temeljena je na uspjehu studenata postignutom tijekom studiranja. Može se očekivati da je uspjeh studenata u području inženjeringa značajno povezan s motivacijskim čimbenicima. Ohland i sur. (2008, str. 259) ističu: „Naši rezultati naglašavaju mogućnost da studij inženjerstva postane privlačniji kvalificiranim studentima“.

Primarni cilj istraživanja u ovom radu, istraživanje motiva nedavno diplomiranih inženjera strojarstva za odabir svoje specijalizacije, podijeljen je u više specifičnih ciljeva i istraživačkih zadataka. Pojedinačni ciljevi (istraživana područja) su: utvrđivanje motiva i izbor specijalizacije studenata s aspekta različitog akademskog uspjeha.

Polazište istraživanja je hipoteza da će studenti koji imaju bolje akademske rezultate pokazati veću motivaciju prema:

- a. mogućnosti za profesionalno usavršavanje
- b. mogućnosti hijerarhijskog napredovanja u tvrtki
- c. uspjehu u struci
- d. ljubavi prema struci
- e. postizanju vidljivog uspjeha na poslu.

Ova je hipoteza formirana na temelju pretpostavke da je uspjeh na studiju povezan s interesom i da ljudi vole zanimanja za koja posjeduju odgovarajuće vještine i koja im omogućuju postizanje uspjeha. Istraživanje u ovom radu također uključuje analizu motiva drugih studenata s obzirom na profesionalnu orijentaciju. Navedeni motivi pokrivaju različite aspekte: usmjerenost prema pozivu, socijalne aspekte i uvjete rada. Osim istraživanja motiva, analizirane su i pojedine specijalizacije u okviru strojarstva koje su odabrali studenti.

Materijali i metode

Istraživanje je provedeno pomoću ankete koju su popunili studenti završne godine Strojarskog fakulteta i diplomirani inženjeri. Pomoću upitnika određena je važnost pojedinih motiva i sklonosti prema određenoj specijalizaciji. Pitanja u anketi su kratka, jasna i nedvosmislena. Odgovori na pitanja koja podrazumijevaju šire prihvaćanje i veću sklonost označeni su većim brojem, dok su pitanja koja podrazumijevaju ograničeno prihvaćanje ili nižu sklonost označena manjim brojevima. Ukupan broj bodova određen je pomoću statističke analize odgovora.

Tijekom formulacije pitanja i izrade upitnika, razmatrani su sljedeći preduvjeti:

1. Forma ankete. Svrha testiranja objašnjena je u zaglavlju obrasca. Pitanja su formulirana na način da omogućuju jasne i jednostavne odgovore.
2. Vrste pitanja u anketi. Pitanja su podijeljena u tri skupine: utvrđivanje motiva, sklonost prema određenoj specijalizaciji, i konačno, osobni podaci.

Struktura ispitanika u vrijeme provođenja ankete bila je sljedeća:

- studenti devetog semestra: 12 (48%)
- diplomanti: 13, (52%)

Ukupan broj sudionika bio je 25.

Broj studenata prema prosječnoj ocjeni:

- studenti s prosječnom ocjenom između 6 i 7 -11
- studenti s prosječnom ocjenom između 7 i 8 -10
- studenti s prosječnom ocjenom između 8 i 9 - 4.

Osnovni elementi upitnika prikazani su u Tablici 1.

Tablica 1.

Dobiveni rezultati statistički su obrađeni i grafički prikazani. Aritmetička sredina izračunata je prema formuli (1).

$$x = \frac{\sum_{i=1}^n k_i \cdot x_i}{N} \quad (1)$$

X_i - procjena

K_i - broj rezultata s odgovarajućom procjenom

N - ukupan broj rezultata

Rezultati su prikazani u obliku aritmetičkih sredina pojedinačnih rezultata i grupirani prema kategorijama uspjeha na studiju (Tablice 2-4).

Rezultati i rasprava

Temeljem rezultata opisanog istraživanja možemo zaključiti da uspješniji studenti pokazuju veću motivaciju prema mogućnosti za profesionalno usavršavanje, mogućnosti za hijerarhijsko napredovanje u tvrtki, uspjehu u struci, postizanju vidljivog uspjeha na poslu i ljubavi prema struci nego slabiji studenti, što u potpunosti potvrđuje postavljenu hipotezu (Slika 2).

Time je svakako potvrđena činjenica da je uspjeh na studiju značajno povezan s razinom aspiracija studenata prema zanimanju koje su odabrali. „Aspiracije vezane uz budućnost imaju važnu ulogu u izgradnji samoodređenja, naročito u periodu sazrijevanja, odnosno u vrijeme kada pojedine težnje prolaze „provjeru stvarnosti“ (Negru, Subțirică, Oprea, 2011, str. 205). Ukupan uspjeh u studiranju i uspjeh tečajeva relevantnih za određenu specijalnost i obrazovni profil imaju veze s profesionalnim aspiracijama, kao i orijentacijom prema određenoj specijalizaciji. Nije nerazumno uzeti u obzir činjenicu da je želja za postignućem, između ostalog, poticaj za postizanje boljeg uspjeha na studiju.

Tablica 2.

Na temelju prikazanih rezultata može se pretpostaviti da će uspješniji studenti pokazati veću sklonost prema napredovanju u hijerarhiji tvrtke. Dakako, ne će svi

pojedinci dobiti potrebne vještine za uspješno upravljanje skupinom, ali većina analiziranih kvaliteta uspješnih studenata ukazuje na to da bi oni ostvarili veći uspjeh u upravljanju kao i pokazali sklonosti za vodeću ulogu. Rezultati opisanog istraživanja pokazuju da je uspjeh na studiju povezan sa sklonošću prema hijerarhijskom napredovanju unutar tvrtke.

Tablica 3.

Tablica 4.

Slika 2.

Dobiveni rezultati upućuju na to da studenti s boljim akademskim uspjehom pokazuju manje zanimanja za motive kao što su jednostavan posao i više slobodnog vremena tijekom dana (Slika 3). To je svakako potvrda da je jedan od glavnih poticaja boljim studentima uspjeh na poslu, ali i samoaktualizacija i kreativnost. Neosporno je da studentima postizanje boljih ishoda učenja također povezuju s ovim motivom. Uspješniji studenti pokušavaju istaknuti svoje sposobnosti i sklonosti, kao i izraziti sve svoje mogućnosti. Zanimljiv je podatak da bolji studenti pridaju nešto manje važnosti dobivanju priznanja. Ovaj rezultat upućuje na njihovu veću orijentaciju prema osobnim sposobnostima i pridavanje manje važnosti socijalnim motivima. Može se primijetiti da je ovaj motiv najmanje izražen motiv u cjelokupnom istraživanju. To se može objasniti i nizom drugih važnih čimbenika koji utječu na motivaciju studenata. Jedan od najvažnijih je svakako nedostatak radnog iskustva, što znatno utječe na formiranje društvenog sklada s kolektivom i motiva vezanih uz prihvaćanje kolektivnih društvenih vrijednosti.

Slika 3.

Među društvenim motivima sljedeći motivi mogu se izdvojiti (Slika 4): zanimanje s većim ugledom u društvu, slobodno ostvarivanje prava kao i korištenje raznih pogodnosti. Navedeni su motivi općenito manje izraženi u cijelom istraživanju.

Slika 4.

Najvažniji motivi cjelokupnog istraživanja su osobni dohodak, dobri uvjeti rada i stabilnost, bez obzira na uspjeh studenata u tijeku studiranja (Slika 5). Može se zaključiti da navedeni motivi nisu izravno povezani s akademskim postignućem, već su rezultat drugih motivacijskih aspekata društvene i ekonomske prirode.

Slika 5.

Analizirajući sklonosti za pojedine specijalizacije, možemo vidjeti da su studenti s boljim akademskim postignućem više orijentirani prema znanstvenim istraživanjima, zaposlenju u računalnom odjelu, upravljanju, organizaciji tvrtke, a manje prema zaposlenju u neposrednom procesu proizvodnje, održavanju opreme za rad i kontroli kvalitete (Slika 6).

Opisani odabir specijalizacije može se pripisati višoj motiviranosti studenata prema mogućnostima za profesionalno napredovanje i napredovanje u hijerarhiji tvrtke. Može se zaključiti da studenti vide veće mogućnosti za ostvarivanje svojih motiva u ovim specijalizacijama. Dakako, temeljem opisanih rezultata ne može se zaključiti da druge specijalizacije ne pružaju dovoljno mogućnosti za uspjeh npr. uspjeh u poslu ili uspjeh u struci. Ono što je najvažnije, na temelju ove analize moguće je bolje razumjeti stavove studenata prema određenoj specijalizaciji.

Slika 6.

Zaključak

Prikazano istraživanje ukazuje na potrebu informiranja studenata o praktičnim aspektima različitih specijalizacija diplomiranih inženjera strojarstva. Takve informacije imaju pozitivan učinak na studente kada je u pitanju odabir specijalizacije u skladu s njihovim sposobnostima, željama i interesima. Na taj način povećava se motivacija studenata i otvara se mogućnost budućim diplomiranim inženjerima strojarstva za postizanje većeg uspjeha u struci.

Ovo pitanje mora se uzeti u obzir i na studijskim programima na sveučilištima. Na temelju analize radnih mjesta, mogu se izraditi opisi i ideje o zanimanjima. Postoje brojni načini primjene obrazovnih tehnologija koje se mogu koristiti u tu svrhu. Kraebber i Lehman (2009, str. 276) naglašavaju: „Nastavno osoblje na visokoobrazovnim ustanovama koje se bave proizvodnim obrazovanjem posjeduje visok relativni intenzitet zanimanja i informiranosti o novim obrazovnim tehnologijama kao i izraženo zanimanje za vrijeme i resurse vezane uz korištenje obrazovne tehnologije u proizvodnom obrazovanju”.

Brojna istraživanja upućuju na korištenje različitih metodologija i edukacijskih materijala u tu svrhu (Dogan, 2010; Ismajli, 2008; Lončarić, 2009). Tang i Austin (2009, str. 1241) navode rezultate istraživanja koje su proveli: „Srednje vrijednosti dobivenih rezultata pokazuju da je video omogućio najviše uživanja. PowerPoint je pružio najviše učenja i motivacije. Internet je omogućio najviše prijava za posao. Mlađi studenti preferirali su video, dok su stariji studenti preferirali predavanje. Rezultati regresijske analize pokazali su da je primjena videa za učenje, projektora i predavanja za uživanje, PowerPointa za karijeru i motivaciju, i interneta za učenje doprinijelo nastavnoj učinkovitosti sveučilišnih profesora”.

Primjena ovih informacija omogućuje studentima da se usredotoče na one specijalizacije koji će odgovarati njihovim sposobnostima, željama i osobnosti, također uzimajući u obzir i osobne mogućnosti. Stručni posjeti tvrtkama i stručna praksa dodatno pružaju realniji uvid u ulogu inženjera u obavljanju pojedinih specijalizacija. Dakako, ne smiju se izostaviti ni informacije o mogućnostima zapošljavanja, stabilnosti zaposlenja, razne beneficije, kao i iznos osobnog dohotka. Sudjelovanje u istraživačkim projektima također ima veliko značenje za razvoj motivacije studenata i izbor određene specijalizacije.