

Innovation competitions - means to generate valuable ideas, advance products and technologies, and enhance entrepreneurial skills

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Innovation competitions have been recognized as tools to promote innovation and entrepreneurship/intrapreneurship at universities, companies and the society at large. As creation of innovative ideas is unpredictable and uncontrollable, while the process of realization of an innovation is well defined and regulated, innovation competitions provide a structured approach to help connect these two processes by generating a pool of ideas (opportunities) and efficient evaluation and selection of the best candidates [1].

Universities often organize competitions in technological innovations in order to educate engineering students in innovation skills (e.g. [2]) but also to cultivate innovation consciousness and encourage work in multidisciplinary teams [3]. Teamwork of students in different study fields, especially those in engineering and in business, is regarded necessary for bridging the invention – innovation gap. Namely, engineering students are traditionally being taught to develop functional prototypes and products without the concern about commercial aspects and market potentials of their inventions. On the other hand, business students study the process of entrepreneurship but lack the knowledge related to creation of functional products [4]. Still, assembling multidisciplinary teams and raising the student awareness have often proved not to be easy as it was shown at the Tianjin University in China [3]. At the Robot Competition organized at this university, the winners were chiefly engineering students with just one student majoring in arts that won a place [3]. Also, in a survey of Internet users in Russia, of which approximately 60 % were university students at all levels, it was reported that over 80 % of respondents have not participated in any innovation competition and only few were informed about national innovation programs and competitions with less than 3 % that actually participated in these programs [5]. Collaboration of universities with enterprises and agencies has shown to be beneficial for both sides often leading to innovative solutions. For universities, advantages include possibilities to test new discoveries in practice, identify areas for improvement and development of curricula, and expose students and faculty to practical problems, while companies gain access to new knowledge and cutting-edge technologies, interact with multidisciplinary teams and research networks, and obtain solutions for specific problems [6]. One of interesting and successful examples is the university-level competition eXploration Systems and Habitation (X-Hab) Academic Innovation Challenge, organized annually by NASA with the aim to develop strategic partnerships and collaborations with universities [7]. Since 2011, NASA has selected 49 X-Hab innovative student concepts from 19 universities that addressed specific, real-world challenges being faced by NASA in the areas of life support, in-space manufacturing and space life and physical sciences. Students, on the other hand, were provided with the possibility to work with NASA experts on a real-world space exploration project from the beginning to a series of NASA-standard project assessments [7].

Companies generally organize innovation competitions in order to inspire employees and customers to generate commercially viable ideas [1,8], but also to enhance intrapreneurship and establish a start-up culture internally [9]. One study has shown that the external contestants generated a larger number of positively rated ideas but the ideas proposed by the employees had in average higher scores with a higher fraction of highly rated ideas [8]. An innovation competition organized within a multinational financial services corporation in Germany with the aim to implement intrapreneurship, raised significant interest of the employees resulting in 255 applications of which 2 winning teams

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were offered funding to bring their products to the market [9]. Still, continual encouragement of the intrapreneurial atmosphere within a corporate environment is faced with significant challenges as it requires a special support to the employees - intrapreneurs, who leave their comfort zones of regular jobs and career advancements by committing to their ideas [9].

Finally, innovation competitions have been supported by governments in an effort to enhance innovation and entrepreneurship in the wider society. These competitions do not only support winners by awards but also provide trainings, encouragement and motivation, introduce the contestants to potential investors and help the contesting teams and start-ups to build networks with different potential users, manufacturers and partners.

In Serbia, the idea of organizing innovation competitions originated at the University of Novi Sad in 2003 in an effort to promote entrepreneurship at the University [10]. Since 2005 the competition has been organized at the national level as the Competition for the Best Technological Innovation under the auspices of the ministry responsible for science and technological development of the Republic of Serbia. The competition was envisioned from the start as a school of technology driven entrepreneurship with the aim to educate the contesting teams in skills that they mostly lack: attracting investors, adapting to the customer needs, finding new applications of the developed technology, creative problem solving, and product presentation, protection and selling [10]. These trainings are often regarded by the contestants as the main benefit of the competition. Along with the main competition category Realized Innovations, a variety of additional categories were organized throughout the years such as Innovative Ideas, Potentials, Energy Efficiency, Best High-School Innovation, etc. As a result, 2539 teams have participated in the competition till now, 366 trainings have been held for 6974 researchers, innovators, entrepreneurs and students and 80 new companies were founded [10]. These figures speak for themselves.

The journal *Hemijska Industrija* supports creative research ideas and innovative solutions and invites teams that participated in innovation competitions to submit manuscripts and present their technological innovations to our readership. In the current issue, the paper High Efficiency Disperse Dryer - an innovative process for drying of solutions, suspensions and pastes in a fluidized bed of inert particles by Đuriš and coworkers describes an innovative fluidized bed dryer, which won fifth place in the Competition for the Best Technological Innovation of the Republic of Serbia in 2017.

Takmičenja u inovacijama – sredstvo za dolaženje do uspešnih ideja, poboljšanje proizvoda i tehnologija, i unapređenje preduzetničkih veština

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REČ UREDNIKA

Takmičenja u inovacijama su prepoznata kao instrumenti za promovisanje inovacija i preduzetništva na univerzitetima, u kompanijama i društvu u celini. Kako je stvaranje inovativnih ideja nepredvidljivo i nekontrolisano, dok je proces realizacije inovacija dobro definisan i regulisan, takmičenja u inovacijama predstavljaju koncept definisane strukture koji može da poveže ova dva procesa kroz generisanje spektra ideja (mogućnosti) i efikasnu evaluaciju i odabir najboljih kandidata [1].

Univerziteti često organizuju takmičenja u tehnološkim inovacijama da bi obrazovali studente inženjerstva u oblasti inovacija (npr. [2]), ali i da bi negovali svest o inovacijama i postakli rad u multidisciplinarnim timovima [3]. Timski rad studenata različitih disciplina, a posebno studenata inženjerstva, sa jedne, i ekonomije i poslovanja, sa druge strane, je naveden kao neophodan za premošćavanje jaza između invencija i inovacija. Naime, studenti inženjerstva tradicionalno uče da razvijaju funkcionalne prototipove i proizvode bez osvrta na komercijalne aspekte i tržišne potencijale svojih invencija. Sa druge strane, studenti ekonomije i poslovanja uče o procesu preduzetništva, ali im nedostaju znanja o samom kreiranju funkcionalnih proizvoda [4]. Međutim, sastavljanje multidisciplinarnih timova i podizanje svesti studenata o inovacijama često nije jednostavno kao što se to pokazalo na Univerzitetu u Tjendinu (*Tianjin University*) u Kini [3]. Na takmičenju iz robotike koje je organizovao ovaj univerzitet, pobednici su najvećim delom bili studenti inženjerstva i samo je jednom student umetnosti osvojio nagradu na ovom takmičenju [3]. Takođe, anketa korisnika interneta u Rusiji od kojih je oko 60 % bilo studenata na svim nivoima studija, je pokazala da preko 80 % ispitanika nije nikada učestvovalo na nekom takmičenju u inovacijama i da je samo mali broj njih znao za nacionalne programe i takmičenja u inovacijama uz manje od 3 % ispitanika koji su učestvovali u tim programima [5]. Saradnja univerziteta sa kompanijama se pokazala kao korisna za obe strane, često dovodeći do inovativnih rešenja. Za univerzitete prednosti te saradnje uključuju mogućnosti za testiranje novih otkrića u praksi, sagledavanje elemenata kurikuluma koji se mogu unaprediti i suočavanje studenata i nastavnika sa realnim problemima iz privrede, dok kompanije dobijaju pristup novim saznanjima i vrhunskim tehnologijama, komunikaciju sa multidisciplinarnim timovima i istraživačkim zajednicama, i rešenja za specifične probleme [6]. Jedan od interesantnih i uspešnih primera je takmičenje na univerzitetskom nivou "Istraživački sistemi i prebivališta (*X-Hab*) – akademski izazov za inovacije" (*eXploration Systems and Habitation (X-Hab) Academic Innovation Challenge*) koje na godišnjem nivou organizuje Američka svemirska agencija NASA sa ciljem razvoja strateškog partnerstva i saradnje sa univerzitetima [7]. Od 2011. g. NASA je odabrala 49 *X-Hab* inovativnih studentskih koncepcija sa 19 univerziteta koje su se odnosile na određene, realne probleme sa kojima se NASA susreće u oblastima održavanja života, proizvodnje u svemiru i izučavanja svemira u prirodnim naukama. Sa druge strane, studenti su imali mogućnost da rade sa ekspertima iz ove agencije na realnom projektu istraživanja svemira od samog početka do serije procena podobnosti projekta koje je NASA razvila i standardno primenjuje [7].

Kompanije organizuju takmičenja u inovacijama najčešće radi motivisanja zaposlenih i korisnika da dođu do komercijalno upotrebljivih ideja [1,8], ali i da podstaknu preduzetnički duh (tzv. *intrapreneurship*) i start-up filozofiju unutar same kompanije [9]. U jednom istraživanju je pokazano da su spoljni takmičari predložili više pozitivno ocenjenih ideja, ali da su ideje koje su predložili zaposleni bile u proseku bolje ocenjene sa većim udelom ideja sa najvišim ocenama [8]. Interno takmičenje u inovacijama organizovano u jednoj multinacionalnoj korporaciji za finansijske usluge u

Nemačkoj sa ciljem da podstakne preduzetništvo unutar korporacije, je izazvalo veliko interesovanje zaposlenih sa 255 podnetih prijava, od kojih su 2 pobjednička tima dobila mogućnost finansiranja svojih proizvoda do izlaska na tržište [9]. Ipak, održavanje stalnog podsticaja za preduzetništvo unutar korporativne sredine je suočeno sa značajnim izazovima pošto zahteva posebnu podršku zaposlenima – preduzeticima koji treba da izađu iz svoje zone komfora regularnog radnog mesta i očekivanog napretka u karijeri da bi se posvetili svojim idejama [9].

Najzad, i države i vlade podržavaju takmičenja u inovacijama da bi se podstakli inovativnost i preduzetništvo u celom društvu. Ova takmičenja ne samo da nagradama podržavaju pobjednike, već takođe pružaju treninge, podstrek i motivaciju učesnicima, predstavljaju učesnike potencijalnim investitorima i pomažu timovima i start-up preduzećima da ostvare veze sa različitim potencijalnim korisnicima, proizvođačima i partnerima.

U Srbiji je ideja o organizaciji takmičenja u inovacijama potekla sa Univerziteta u Novom Sadu 2003. g. u nameri promovisanja preduzetništva na Univerzitetu [10]. Od 2005. g. takmičenje se organizuje na nacionalnom nivou pod nazivom Takmičenje za najbolju tehnološku inovaciju pod okriljem resornog ministarstva za nauku i tehnološki razvoj Republike Srbije. Takmičenje je od samog početka zamišljeno kao škola visokotehnološkog preduzetništva sa ciljem da obrazuje timove učesnike u pogledu veština koje im najviše nedostaju: kako privući investitore, kako se prilagoditi potrebama korisnika, kako pronaći nove primene za svoju tehnologiju, kako kreativno rešavati probleme i kako predstaviti, zaštititi i prodati svoj proizvod [10]. Ove treninge učesnici često ocenjuju i kao najveću vrednost i korist takmičenja. Pored osnovne kategorije takmičenja Realizovane inovacije, različite dodatne kategorije su bile organizovane tokom godina, kao što su Inovativne ideje, Potencijali, Energetska efikasnost, Najbolja srednjoškolska inovacija itd. Kao rezultat, 2359 timova je učestvovalo u takmičenjima do sada, održano je 366 treninga za 6974 učesnika istraživača, inovatora, preduzetnika i studenata, i osnovano je 80 novih kompanija [10]. Ove brojke govore same za sebe.

Časopis **Hemijska industrija** podržava kreativne ideje u istraživanjima i inovativna rešenja i poziva timove učesnika takmičenja u inovacijama da podnesu radove i predstave svoje tehnološke inovacije našim čitaocima. U ovom broju, u radu pod nazivom *High Efficiency Disperse Dryer - an innovative process for drying of solutions, suspensions and pastes in a fluidized bed of inert particles* autora Đuriš i saradnika opisan je inovativni sušionik sa fluidizovanim slojem koji je zauzeo peto mesto na Takmičenju za najbolju tehnološku inovaciju u Republici Srbiji 2017. g.

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