

IPROD

530577-TEMPUS-1-2012-1-RS-TEMPUS-JPCR

**Improvement of Product Development Studies
in Serbia and Bosnia and Herzegovina**



<http://iprod.masfak.ni.ac.rs>
iprod@masfak.ni.ac.rs



***UNIVERSITY OF BELGRADE
FACULTY OF MECHANICAL ENGINEERING***

**Required competences and learning outcomes of curriculums
in field of Management of Product Development, Innovations
management, Eco-product Development, and Industrial
Product Development**

REPORT

Belgrade, 2013.

This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Introduction

In order to gather informations about existing knowledge level in the area of the product development, innovative management, application of the product development strategy, needs of technologies improvement, technical legislation, latest trends in quality and human resources management, as well as about the relevant opinion of modern industrial companies, appropriate survey in Belgrade area has been carried out.

Relevant questionnaires have been sent to the 11 companies but only 10 filled questionnaires have returned back. Companies mentioned above are:

No.	Name of the company	Established	Type	Total number of employees	Number of persons who filled questionnaires
1	JKP GSP Beograd	-	Public company	>250	1
2	CAD FEM Pro	2008.	Private company	<9	1
3	FKL Temerin	1960.	Private company	>250	1
4	PRIM Kostolac	2005.	State enterprise	>250	1
5	ROTECH	2002.	Private company	<9	2
6	BSK Obrenovac	2008.	Private company	10-49	1
7	MS Termopro	1992.	Private company	10-49	1
8	Kolubara Metal	1953.	State enterprise	>250	1
9	TRC Pro	1989.	Private company	<9	1
In total					10

I. Product development and innovative management knowledge as well as the consciousness/needs about/of innovations within the company

Companies had to answer a question „Do you think that the following factors are important for the work-creativity growth?" and as the most important they selected „Internal communication", „Company's management policy" and „Personality of employees" (40% have pointed as "very important", and 50% as "important"). As the least important they pointed "Cultural background" (40% - "not so important") and "Time table pressure" (10% - "not so important" and 10% - "not important at all").

The differences between grades given by respondents from the large and small/medium companies were determined. Large companies consider that creativity growth at work is mostly influenced by the "Financial motivation" while people from small and medium enterprises consider "Internal communication" as the most influencing factor.

Regarding the question concerning improvements made within the company in the past 3 years, respondents have answered that significant improvement were made in services (70%), products (60%), technologies (60%) and at least in the organization of the business (30%) - as expected because of nature of questioned companies.

All of the respondents have answered that their employees do have trainings and 40% answered that all of their employees have trainings, while 60% answered that only some of their staff members have adequate trainings.

40% of respondents answered that their employees doesn't have organized internal trainings (organized within enterprise), while 60% answered that their companies regularly organize trainings for employees - especially about the new software and new equipment. Besides that, the largest number of training programs (30%) is related to the staff skills development.

Question "If you had a chance to have creativity development training, which tool would you like to learn?" had highest grade (4.38) for workshops/conferences/seminars and the least grade for the CD (3.00) and e-learning platform (3.50).

Regarding to question if company is performing innovative activities, 60% of respondents gave answer that they cooperate with scientific-expert institutions, 10% with other companies and 50% perform innovative activities by themselves.

As the results show, 60% of companies are having strong connections with academic institutions, while some have contacts only with local universities (40%) and with local higher education schools (20%).

II. Strategy of the product development (marketing, concurrence, orientation of the company to the customer etc.)

All of the respondents answered that their companies have some ideas about the future, among them 40% without precise plan and 50% considers that their company has plans for 1-2 years period and their business plans are applicable only for that time period, while 30% of companies has plans for at least midterm time period.

That projects, that will be done in the company, are selected on the operative basis in connection with the market opportunities, 90% consider to be true, and 10% consider opposite.

10% of respondents consider that their companies don't possess relevant information about the latest trends in marketing planning, 20% claims that their companies don't plan marketing activities or that they only react on current market trends and 70% claims that their enterprises try to follow latest market developments and prepare themselves for such situation.

Only 10% of respondents claim that situation at the market is considered only when problems appear and 50% said that their companies do perform concurrence monitoring but not continuously, while 40% systematically investigate market position versus concurrence.

Significant percentage of respondents (40%) is considering that everything about customer's requests and needs is already predefined by relevant technical legislation and existing documentation, while 50% develop new products on customer demands basis. It's important to mention that even 30% of respondents said that they permanently analyse wide spectrum of customer needs and that they continuously monitor customer satisfaction level.

50% of respondents answered that their companies already possess innovation strategies and other half claims that there is a real need for their companies to establish innovations as integral part of company's strategy.

Overall, 40% of respondents are certain that their companies do everything in their power to find resources for development but they are not sufficient, 30% has opinion that development of their companies is useful but they can't afford it at the time and 30% has a stable budget planned for the future development.

III. New technologies, planning, organization and human resources

The most of the respondents (60%) consider that some of the employees in their companies continuously follow the latest trends in product development area and that they report to the management on everyday basis, while 40% claims that their employees are interested in development and application of new technologies only because of personal interests and satisfaction.

About 70% of respondents are certain that their companies have a progressing technology improvement, while 20% thinks that technological changes and efficiency improvement is only planned but not yet implemented. That their companies can't afford technological improvements at the moment consider only 10% of respondents.

Annual strategic plans are done in 90% of companies, while 20% has plans that take into account trends for the following 2-3 years¹.

Respondents consider that 40% of employees in their companies accept organization jobs as a part of their regular work, while 20% do organization jobs only occasionally.

80% of respondents consider formal and informal communication between employees as good manner, while team work is modestly and when needed applied, 10% think that their companies have well organized multidisciplinary teams with clearly defined responsibilities, while 10% has an opinion that communication is insufficient and team work is not useful.

50% of survey participants consider that information system of the company has easy usable information for operative and strategic management, while other half thinks that this information are gathered but not efficiently used.

¹ In some questions total score of results exceeds 100% because respondents have selected multiple answers;

50% of respondents is certain that responsibility for the product development is a matter of companies higher management, while 10% considers general manager responsible for the product development process. Also, 10% has no clear picture about the hierarchy in the product development process and 30% thinks that only one manager is responsible for product development in their companies.

In total 80% of respondents said that independent teams are formed for development of new products within their companies and that project timing, team members skills and resources are well planned and harmonized, while 20% thinks that resources are daily distributed among current projects depending on their specific needs and resource availability.

60% of survey participants thinks that team gather only at the startup of the project and organized meetings, 10% thinks that teams are always assembled wrongly. Only 10% of people think that their company has a high-tech approach in team management.

IV. Quality - standards - ecology

60% of respondents thinks that praxis and quality procedures of the company are as in the standards, 20% thinks that there are some restrictions in their companies quality procedures, 10% thinks that quality control exists only in the manufacturing process and 10% claims that their companies have implemented TQM (Total Quality Management) system.

60% of survey participants tries to follow up standards, regulations etc. while implementing novel product/procedures in their companies, while 20% thinks that changes and trends in quality regulations are systematically followed and analyzed. Only 20% of respondents claim that their companies can't track trends in quality management due to lack of companies capacities.

More than half of the respondents (70%) think that their companies plans external quality revisions and 30% claim that their companies periodically and systematically organize external controls in cooperation with customers and providers.

60% of respondents has knowledge about the ecological regulations and think that their companies are obeying them and 30% claim that their companies even possess ISO-14000 certificate, while only 20% have no knowledge about ecological regulations and their company pays no attention on ecology issues.

70% of survey participants think that their companies purchase new regulations and standards only when problems appear, while 30% claims that their company continuously follows up latest developments in the area of technical legislation.

V. Which knowledge product development engineers need to have (basic knowledge and time dependent knowledge)?

The results concerning knowledge about the product development are statistically processed and shown at the Table 1.

Based on the answers of the respondents, expert technical knowledge is the most important skill necessary for successful product development. Offered choices are assessed as follows: product development (4,56), mechanical design (4,30), testing of products (4,22), information systems (4,00), and technological analysis and production planning (3,78). The lowest grade has mechatronics (3,65).

Skills and specific knowledge, such as foreign languages got 4,00 while creative potential and elaboration skills got 3,80.

Methodological knowledge is ranked as the third highest after technical knowledge. The grades are: simulation (4,22), quality management (3,78), project management (3,60), product development methods (3,50), human resources management (3,50), while innovation management has a grade of 3,44.

The lowest grades are for economic and legal knowledge: profitability analysis (3,10), patent right and protection (3,10), basics of economy (2,90), marketing (2,80), business finances (2,80), and economic law (2,67).

There is a significant difference in grading between large/medium and small/micro companies. The highest difference is in mechanical design: small/micro companies give higher grade (4,83) versus large/medium companies (3,50).

No.	No from the Questionnaire	Type of knowledge	Total grade	Medium-sized enterprises and above	Micro-entities and small companies
1.	2.	Product development (Morphology and conceptual elaboration, Development of product variants, Analysis of the structure and selection of the solution)	4,56	4,33	4,67
2.	1.	Mechanical Design	4,30	3,50	4,83
3.	6.	Testing of the product	4,22	4,00	4,33
4.	9.	Simulation (finite elements method, visualization and evaluation, multy-body simulation)	4,22	4,67	4,00
5.	8.	Information systems (information basics, geometrical modeling, virtual engineering)	4,00	3,75	4,17
6.	20.	Foreign languages	4,00	3,75	4,17
7.	13.	Creative potential and the elaboration skills	3,80	4,00	3,67
8.	3.	Technological analysis and planning of the manufacture	3,78	4,00	3,67
9.	7.	Quality management	3,78	3,67	3,83
10.	10.	Project management	3,60	4,00	3,33
11.	5.	Mechatronics	3,56	3,00	4,00
12.	4.	Product development methods	3,50	3,50	3,50
13.	12.	Human resources management	3,50	3,75	3,33
14.	11.	Innovative management	3,44	4,00	3,17
15.	17.	Profitability analysis	3,10	3,50	2,83
16.	18.	Patent rights and protection of intellectual property	3,10	3,25	3,00
17.	14.	Basics of economy	2,90	3,00	2,83
18.	15.	Business finances	2,80	3,00	2,67
19.	16.	Marketing	2,80	3,00	2,67
20.	19.	Economic Law	2,67	2,67	2,67