Improvement of Product Development Studies in Serbia and Bosnia and Herzegovina

UNIVERSITY OF NOVI SAD

FACULTY OF TECHNICAL 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

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Introduction

In order to gather information 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 province Vojvodina has been carried out.

Relevant questionnaires have been sent to the 10 companies but only 7 filled questionnaires have returned back. Companies mentioned above are:

No.	Name of the company	Established	Type	Total number of employes	Number of persons who filled questionnaries
1	Bearing factory – FKL, Temerin	1960	Private company	>250	2
2	Vizor	1996	Private company	50-249	1
3	NAFTAGAS – Technical service d.o.o. Zrenjanin	2012	Private company	>250	1
4	"Norma grupa jugoistočna Evropa" d.o.o.	2011	Private company	>250	1
5	ATB Sever d.o.o.	1923	Private company	>250	3
6	Accumulators Factory Sombor, Koncern Farmakom MB Šabac	1953	Private company	>250	2
7	Dunkermotoren Subotica d.o.o.		Private company	50-249	1
				In total	11

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" (90.9%), „Company's management policy" (63.6%) and „Personality of employees" (36.4% have pointed as "very important", and 63.4% as "important"). As the least important they pointed "Cultural background" (45.4% - "not so important", 18.2% "not important" and 36.4% "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 " Company's management policy " while all people 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 products (81.8%), organization of the business (72.7%), technologies (45.4%) and at least in the services (27.3%).

All of the respondents have answered that their employees do have trainings and 36.4% answered that all of their employees have trainings, while 27.3% answered that only some of their staff members have adequate trainings and 36.4% answered that only some of their staff go to training if they have good opportunity.

45.5% of respondents answered that their employees doesn't have organized internal trainings (organized within enterprise), while 54.5% answered that their companies regularly organize trainings for employees - especially about the innovation management and training courses (66.7%).

Question "If you had a chance to have creativity development training, which tool would you like to learn?" had highest grade (4.3) for workshops/conferences/seminars and the least grade for e-learning platform (2.5).

Regarding to question if company is performing innovative activities, there are also multiple answers, so 63.4% of respondents gave answer that they cooperate with scientific-expert institutions, 27.3% with other companies and 63.4% perform innovative activities by themselves. As the results show, 27.3% of companies are having strong connections with academic institutions, while some have contacts only with local universities (45.4%) and 27.3% of companies are not connected with any academic institution. However, there is no company connected with local higher education schools.

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

Only 28.5% of the respondents answered that their companies have some ideas about the future but without precise plan and other said their companies have present actual problems without planning in further future.

That project, which will be done in the company, is selected on the operative basis in connection with the market opportunities, 85.7% consider being true, and 14.3% consider opposite.

42.7% of respondents consider that their companies don't possess relevant informations about the latest trends in marketing planning, 28.5% claims that their companies don't plan marketing activities or that they only react on current market trends and 28.8% claims that their enterprises try to follow latest market developments and prepare themselves for such situation.

Only 14.3% of respondents claims that situation at the market is considered only when problems appears and 42.8% said that their companies do perform concurrence monitoring but not continuously, while 57.1% systematically investigate market position versus concurrence. Significant percentage of respondents (85.7%) is considering that everything about customer's requests and needs is already predefined by relevant technical legislation and existing documentation. 42.8% develop new products on customer demands basis. It's important to mention that even 42.8% of respondents said that they permanently analyses wide spectrum of customer needs and that they continuously monitor customer satisfaction level.

85.7% of respondents claim that there is a real need for their companies to establish innovations as integral part of company's strategy. 28.5% of respondents answered that their companies do not possess innovation strategies and 14.3% claim their strategy is understood by their leadership. Overall, 57.1% of respondents are certain that their companies do everything in their power to find resources for development but they are not sufficient, 14.3% has opinion that development of their companies is useful but they can't afford it at the time and 28.5% has a stabile budget planned for the future development.

III. New technologies, planning, organization and human resources

The most of the respondents (42.8%) 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 42.8% claims that their employees are interested in development and application of new technologies only because of personal interests and satisfaction. Only one respondent said his company does not follow the latest trends in product development.

About 42.8% of respondents are certain that their companies have a progressing technology improvement, while also 42.8% 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 14.3% of respondents.

Annual strategic plans are done in 57.1% of companies, while 28.5% has plans that take into account trends for the following 5 and more years and 14.3% do not make future plans at all.

Respondents consider that 85.7% of employees in their companies accept organization jobs as a part of their regular work, while 14.3% do organization jobs only occasionally.

42.8% of respondents consider formal and informal communication between employees as good manner, while team work is modestly and when needed applied, also 42.8% think that their companies have well organized multidisciplinary teams with clearly defined responsibilities, while 14.3% has an opinion that communication is insufficient and team work is not useful.

42.8% of survey participants consider that information system of the company has easy usable information for operative and strategic management, while 28.5% thinks that this information are gathered but not efficiently used and other 28.5% thinks information are hard to obtain.

57.1% of respondents is certain that responsibility for the product development is a matter of companies higher management, while 14.3% considers general manager responsible for the product development process and 28.7% thinks that only one manager is responsible for product development in their companies.

In total 85.7% 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 14.3% thinks that resources are daily distributed among current projects depending on their specific needs and resource availability.

42.8% of survey participants thinks that team gather only at the startup of the project and organized meetings, 28.5% thinks that teams are always assembled wrongly. 28.5% of people think that their company has effective approach in team management.

IV.   Quality - standards - ecology

71.4% of respondents thinks that praxis and quality procedures of the company are as in the standards and 28.6% claims that their companies have implemented TQM (Total Quality Management) system.

57.1% of survey participants tries to follow up standards, regulations etc. while implementing novel product/procedures in their companies, while 42.9% thinks that changes and trends in quality regulations are systematically followed and analyzed.

57.1% think that their companies plans external quality revisions and 42.9% claim that their companies periodically and systematically organize external controls in cooperation with customers and providers.

71.4% of respondents claim that their companies even possess ISO-14000 certificate, 14.3% of respondents has knowledge about the ecological regulations and think that their companies are obeying them, while 14.3% said that their companies even possess ISO-14000 certificate and form ecological friendly company.

57.1% claims that their company continuously follows up latest developments in the area of technical legislation and 42.9% of survey participants think that their companies purchase new regulations and standards only when problems appear.

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 (4.45), mechanical design (4.27), technological analysis and production planning (4.27), testing of products (4.09) and information systems (3.91). The lowest grade has mechatronics (3.82).

Skills and specific knowledge, such as foreign languages got 4.00 while creative potential and elaboration skills got 3.82.

Methodological knowledge is ranked as the third highest after technical knowledge. The grades are: product development methods (4.27), simulation (4.18), innovation management has a grade of 3.91, project management (3.82), quality management (3.73), human resources management (3.55), while.

The lowest grades are for economic and legal knowledge: patent right and protection (3.73), profitability analysis (3,55), marketing (3.36), basics of economy (3.18), business finances (3.09), and economic law (2,91).

Table 1.

No.	Name from the Questionnaire	Type of knowledge	Total grade
1	2.	**Product development** (Morphology and conceptual elaboration, Development of product variants, Analysis of the structure and selection of the solution)	4.45
2	1.	**Mechanical Design**	4.27
3	3.	**Technological analysis and planning of the manufacture**	4.27
4	4.	**Product development methods**	4.27
5	9.	**Simulation** (finite elements method, visualization and evaluation, multy-body simulation)	4.18
6	6.	**Testing of the product**	4.09
7	20.	**Foreign languages**	4.00
8	8.	**Information systems** (information basics, geometrical modeling, virtual engineering)	3.91
9	11.	**Innovative management**	3.91
10	5.	**Mechatronics**	3.82
11	10.	**Project management**	3.82
12	13.	**Creative potential and the elaboration skills**	3.82
13	7.	**Quality management**	3.73
14	18.	**Patent rights and protection of intellectual property**	3.73
15	12.	**Human resources management**	3.55
16	17.	**Profitability analysis**	3.55
17	16.	**Marketing**	3.36
18	14.	**Basics of economy**	3.18
19	15.	**Business finances**	3.09
20	19.	**Economic Law**	2.91