Cost-Oriented Agile Innovation for Mechatronics Management in Less Developed Regions

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Abstract: Cost-oriented automation has a long tradition in IFAC and attracts a lot of attention in literatures associated, for example, with business process improvement. Whilst process-oriented cost reduction (such as LEAN for example) have been widely disseminated, in recent years practical cost-oriented solutions for automatic processes have not been reported so much in the literature. This is surprising given the increasing constraints upon, for example, manufacturing organisations in less developed peripheral regions. This paper re-energises the cost-oriented automation discourse by presenting projects which have used low-cost digital solutions to achieve potentially excellent results. The main contribution of the paper is to demonstrate practical applications of cost-oriented thinking in contexts where practical, cost-oriented automatic control are essential, such as post-conflict developing regions.

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1. INTRODUCTION

IFAC formerly was an important channel for disseminating cost-oriented applied research in automatic control. However, following the sad death of Professor Heinz Harald Ehrbe, a pioneer and driver of cost-oriented automation and control research, for a few years this domain of activity lost focus. In 2011 TC 9-5 adopted cost-oriented automation and control formally into its scope and since then research has begun to steadily grow in cost-sensitive regions. This paper reports an application which replaces older, unwieldy and expensive technology with lightweight, miniaturised digital system in the food processing sector. As well as setting out the general development process and highlighting key features of the technology, we summarise the challenges for cost-oriented mechatronics research in less developed regions, and some of the lessons learned which might inform a cost-oriented development methodology for the development of cost-oriented solutions.

2. BARRIERS TO INNOVATION IN LESS DEVELOPED REGIONS

Measuring and evaluating the R&D activity and performance in the Western Balkans can reveal much about the potential for reaping further benefits in terms of productivity at the firm level as well as international competitiveness of the economy as a whole.

Several important studies on R&D and innovation in the Western Balkans including Kosovo have contributed to the discussions on Research, Development and innovation performance and potential. Even the region shows some of the potential elements for growth, although there are significant discrepancies among the economies, with the problems of low R&D industry demand, brain drain, weak business R&D investments, and limitations in infrastructure and financing.

In Kosovo the research and technology development (RTD) is still a marginal undertaking. Even basic science and technology statistics are lacking. A functional system of innovation does not yet exist. Major reasons for this deficiency were the exclusion of the academic and research community in the pre-war phase, when academic personnel were isolated from international scientific development; the material and immaterial destruction during the war; and the difficult post-war economic recovery process. In the Higher Education Strategy (2005-2015), research found its place as a subsequent priority in timing and scope. In the new Kosovo Education Strategic Plan 2011-2016, the promotion of science and technology for a modern society, with special attention to ICT, is among the goals of education sector. Yet, until recently, general public expenditure on R&D in Kosovo amounted to only around 0.1 percent of GDP.

Industrial demand for R&D in Kosovo is also limited. The absorptive knowledge and technology capacities are severely limited in size, scope, and quality, mainly due to the absence of any critical mass of research and...
technological development funding for at least the last 20 years. Moreover, the potential absorptive capacities in the economy and academia in Kosovo are not well utilized, nor are they able to cope with technological progress. The internal structure of the relevant central institutions also depicts a lot of deficits. There is lack of awareness of the advantages, pitfalls, conditions, and complexity involved in a system of innovation. In general, the higher education system in Kosovo is characterized by marginalization of R&D [1]. The National Research Program of Kosovo, approved in March 2010, aims to provide a conceptual framework for upgrading scientific capacities in the country.

3. COST ORIENTED MANUFACTURING: A FOOD PROCESSING APPLICATION

In order to meet basic requirements: High quality, Robustness, Low cost, Time to market and Costumers satisfaction, nowadays all over the world and in less developed countries are applied production processes based on concurrent engineering principles.

The request from a production company has been made to solve the problem they were facing with a new bought flips dosing machine. Initially it was required to set-up the digital programmable part. Based on contact with the machine supplier and our experience, the programmable part has been fixed. Due to some mechanical issues, also weight and size characteristics of flips it came that this machine is suitable for dosing Nuts, Coffee beans, Pellets, Sugar and Salt but it is not suitable for dosing of flips.

Our suggestion to the company was that we can modify this mechanical problems which will cost some money, but due to the warranty from the supplier it would be better to get in touch with them, explain all of our results and try instead to get another dosing machine which is suitable for dosing flips. The supplier has responded with a different flips dosing machine, which has worked properly.

Our suggestion to the company was that in the future before they decide to buy a new machine or implement a new production process it would be wise for them to consult with us, in order to avoid similar problems.

4. WHAT WORKED WELL

Build trust, adaptability, flexibility and openness to change, brought the new request from the same food processing company to digitalize an old analog control dosing machine, made on the 80’s placed on Mechatronics Lab of UBT Fig 1.

Just to mention that the company has offered internship and job opportunities for our students.

5. DIFFICULTIES ENCOUNTERED

Build trust, adaptability, flexibility and openness to change are the most difficult part for cost-oriented research. It was difficult to assure them to bring the machine in our lab. Because for us it is nearly impossible to send our staff in the factory in daily basis to conduct work, due to their duties in teaching process. Bringing the machine to the UBT Machatronics Lab, was quite important and worthy for our students to see and participate in this process.

6. SYNTHESIS: TOWARDS A COST-ORIENTED INNOVATION METHODOLOGY FOR MECHATRONICS PROJECTS IN LESS-DEVELOPED REGIONS

UBT is the only institution in Kosovo and in the region that offers Mechatronics Management Programme. Small and medium enterprises in Kosovo actually are implementing new cost oriented technologies and also they own some machines from 80’s which need to be upgraded. Well-equipped laboratory, Well-prepared and dedicated staff has made this process to run in the easiest way. The only problem was supply placed equipment and in some cases when it was necessary to integrate some electronics components to create a module.

7. CONCLUSIONS

This Practically applied Cost-Oriented Agile Innovation process which is done from UBT to solve problems in industry, implement new production digital line systems and bring to our students opportunities to gain knowledge in Learning-by-Doing model, has positive impact to innovation in less developed regions. Also this process will bring some more opportunities for students to do the internship and get employment in companies.

REFERENCES
[1] L. Stapleton (2011). “Technology Adoption in Post-Conflict Regions”, Journal of Global Information Management, (JGIM), 19(3) pp. 65-84.

[2] Shetty, D., Kolk, R., (2011). Mechatronics System Design, pp:525, Cengage Learning

[3] Kopacek, P., Shala, M., Ismaili, K., Sylaj, F., Research and Education with Scrap, 15th Workshop on International Stability, Technology, and Culture, IFAC, June 6-8, 2013. Prishtina, Kosovo