AGILE INNOVATION FOCUSED ON COST FOR MECHATRONICS MANAGEMENT IN LEAST DEVELOPED AREAS

Ranjan Kishore Mallick[1],Aliva Mohanty[2]
[1]Professor, Department of Mechanical Engineering, Raajdhani Engineering College, Bhubaneswar, Odisha
[2]Assistant Professor, Department of Mechanical Engineering, Raajdhani Engineering College, Bhubaneswar, Odisha

Abstract: In the IFAC, cost-oriented automation has a long history and receives a lot of attention in literature related to, for instance, business process improvement. While process-oriented cost reduction strategies (like LEAN, for instance) have been extensively publicized, recent years have seen a decrease in the amount of effective cost-oriented solutions for automated processes described in the literature. Given the growing restrictions on, for instance, manufacturing organizations in less developed peripheral regions, this is unexpected. By highlighting initiatives that have employed low-cost digital technologies to possibly achieve good results, this article re-energizes the cost-oriented automation argument. The paper's key contribution is to show how cost-oriented thinking may be used practically in situations where practical, cost-oriented automated management is crucial, such post-conflict developing areas.
Keywords: *Cost-oriented automation, RTD, Mechatronics*

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.

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.

2. 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 dossing 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.

3. 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

Mechatronics design process approach split in Modeling/Simulation, Prototyping and

Deployment/Life cycle has been applied [2]. The total cost of Sensors, Actuators, Digital Control Equipment and Service was
€2100 which is two times lower price than the new machine. Also it is important to mention that every mechanical and electrical part which was in good technical conditions has been modified for reuse. All above mentioned steps were implemented from UBT staff and students, Just to mention that the company has offered internship and job opportunities for our students.

4. DIFFICULTIES ENCOUNTERED

The hardest component of cost-oriented research is establishing trust, adaptability, flexibility, and willingness to change. Getting them to bring the machine inside our lab was tough to guarantee. Because of their responsibilities in the educational process, it is almost difficult for us to send our employees to the plant on a regular basis to do work. Bringing the machine to the UBT Machatronics Lab was really significant and worthwhile for our students to witness.

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

In Kosovo and the surrounding area, the Mechatronics Management Programme is solely offered by UBT. Small and medium-sized businesses in Kosovo are really integrating new, more affordable technologies, yet they also have older equipment that has to be replaced. The simplest approach has been made possible by a well-equipped laboratory and a committed crew that is well-prepared and committed. The only issue was supply-placed equipment, and occasionally it was required to combine some electronics parts in order to build a module.

6. CONCLUSIONS

The Practically Applied Cost-Oriented Agile Innovation approach used by UBT to address industrial challenges, deploy new production digital line systems, and give our students learning-by-doing chances has a good influence on innovation in less developed countries. Additionally, this method will provide students greater possibilities to complete internships and land jobs with businesses.

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