

PUBLIC SELECTION BASED ON QUALIFICATIONS AND INTERVIEW FOR THE AWARDING OF NO. 3 EARLY STAGE GRANTS LASTING 12 MONTHS FOR CONDUCTING RESEARCH PURSUANT TO ART. 22 OF LAW NO. 240/2010 FOT A.D. ING-IND/35 (BUSINESS AND MANAGEMENT ENGINEERING), ING-IND/15 (DESIGN METHODS FOR INDUSTRIAL ENGINEERING) AND ING-IND/13 (APPLIED MECHANICS) AT THE DEPARTMENTS AND CENTERS OF UNIVERSITY OF BERGAMO - PICA CODE 20AR029

announced with decree of the Chancellor Rep. no. 606/2020 of 27.11.2020 and posted on the official registry of the University on 07.12.2020

RESEARCH PROJECT - CODE N. 1

“Supply chain restructuring over global challenges and opportunities”

Research structure: Centre for territorial studies “Lelio Pagani” - CST

Duration of the grant: 12 months

Scientific Area: 09 – Industrial and information Engineering

Academic recruitment field: 09/B3 – Business and management Engineering

Academic discipline: ING-IND/35 – Business and management Engineering

Scientific Director: Prof. Matteo Giacomo Maria KALCHSCHMIDT

With the rise of globalization, companies have started to include manufacturing location decisions amongst their most delicate strategic decisions, given that they have an impact both on short and long-term performance (Porter, 1986). Starting from the 80s, many companies, attracted by the promise of lower costs, decided to move to foreign countries not only low value-added activities, such as production, but also high-value functions (Contractor et al., 2010). This phenomenon, known as offshoring, has been defined as “the assignment of business activities to locations outside a firm’s national borders to support existing business operations” (Mihalache and Mihalache, 2016, p. 1105). As such, offshoring entails the geographical dispersion of a firm’s value chain activities, thus giving rise to global value chains (Mudambi, 2008) that might expose companies to higher risks (Manuj and Mentzer, 2008), as well as transforming the manufacturing landscape in developed countries (Hallward-Driemeier and Nayyar, 2017). In the last decade, companies have started to consider other factors, besides costs, in their manufacturing location decisions. In particular, companies that had previously moved their activities offshore, have started relocating them back considering, for example, tax benefits and poor product quality reasons (Benstead et al., 2017; Fratocchi et al., 2016). Thus, a new trend is rising, identified in multiple literature streams as backshoring (alternatively as back-reshoring or reshoring) and defined as “a voluntary corporate strategy regarding the home country’s partial or total re-location of (in-sourced or out-sourced) production to serve the local, regional or global demands” (Fratocchi et al., 2014).

The interest in the backshoring phenomenon started to spread amongst practitioners, policymakers and academia during the global financial crisis. The return of manufacturing was considered as a means for the re-industrialization of developed countries (Pisano and Shih, 2009). In fact, besides the impact on companies, this phenomenon has a social implication by restoring lost competences (Nujen et al., 2018) as well as creating jobs opportunities. Similarly, we expect the interest to start skyrocketing again after the Covid-19 pandemic crisis. The pandemic has laid bare the fragility along global supply chains, and since companies may no longer consider the cost savings of offshoring to be worth the risk, they may look at backshoring their productions (Javorcik, 2020). Due to increased volatility and uncertainty, additional forms of relocation strategies may also be considered by companies, generally identified as ‘Relocations of Second Degree’ (Barbieri et al., 2019). As such, studying this phenomenon is relevant nowadays as never before. Generally, in global crises, such as the current Covid-19 outbreak, companies may react by re-evaluating and restructuring their global supply chains (Roh et al., 2011), by altering location and sourcing decisions. Furthermore, other global challenges might entail the

restructuring and reconfiguration of global supply chains. For instance, concerns about modern slavery, sluggish economic growth, youth unemployment and the growing threat of protectionism are increasingly attracting the attention of regulators and consumers alike. In addition, the ongoing climate crisis has also started to affect companies and make them reevaluate and reconsider their manufacturing footprints (Fratocchi and Di Stefano, 2019). Such challenges accentuate the need for new risk factors to be taken into account more seriously during location decisions and thus revise the traditional decision-making process and criteria (Boffelli et al., 2020). Beside challenges, there are also global opportunities to switch from a global and complex to regional and more integrated supply chains, that can be concentrated either in one or in few locations, thus making back-reshoring and near-shoring a valuable option. One of these opportunities is represented by new technologies, which provide potential for effective reconfiguration of global supply chains (Ancarani et al., 2019; Dachs et al., 2019).

The research will consist of four steps:

1. Literature review: review of prior literature investigating relocations and connected sourcing decisions of manufacturing activities, as well as the literature about supply chain restructuring in response to global crises. Thus, the candidate will identify the research gaps within the literature and will define the research questions. Finally, a research framework will be developed as basis for the empirical part of the project.
2. Secondary data collection and identification of potential interesting cases: the research candidate will collect all the relevant cases from the news, social media and press releases within Italy and Europe, to identify potential interesting cases to be further investigated and to assess which would be the best source of primary data. Some innovative methodologies, such as topic modelling and qualitative big data analysis will be used to develop insights from the collected secondary data.
3. Primary data collection: the method for data collection will be selected depending on which source of primary data would have been identified as most suitable from the previous step. Two alternatives are hereby proposed: either multiple case studies or a Delphi study. Both the methods would be conducted collecting data from UK, Italy, and Norway.
4. Dissemination of results: the research candidate will conduct several activities to disseminate the results of the research: such as, presenting results to conferences and develop research papers.

References

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RESEARCH PROJECT - CODE N. 2

“Artificial intelligence techniques for ergonomics and collaborative robotics”

Research structure: Department of Management, information and production engineering

Duration of the grant: 12 months

Scientific Area: 09 – Industrial and information Engineering

Academic recruitment field: 09/A3 – Industrial design, machine construction and metallurgy

Academic discipline: ING-IND/15 – Design methods for industrial engineering

Scientific Director: Prof. Caterina RIZZI

The WATCHMAN project aims to develop a hub of skills and experimentation on Computer Vision, through the development of Research and Development Goals developed in two application cases. The main goal is the creation of a new element of manufacturing processes (process innovation) with a high impact on product quality. It is the creation of a methodology with a modular approach for the design of highly reconfigurable Machine Vision systems, thanks to the introduction of the latest technological innovations in artificial intelligence, vision systems, collaborative robotics and data management. The purpose of the intervention is the creation of an extremely modular and easily reconfigurable system prototype, capable of solving heterogeneous artificial vision problems in manufacturing and beyond. In particular, modularity will allow the creation of interconnected but independent systems, and therefore usable together or alone on the basis of the needs of the end user. The reconfigurability will make the system easily adaptable to the solution of artificial vision problems in very different productive realities, covering the whole of the Lombard manufacturing sectors.

The research activity will mainly be focused on one workpackage: COLLABORATIVE ROBOTICS-ERGONOMICS module

The goal is to allow robots and human operators to work together with mutual benefit. The robot moves the image acquisition system by sharing the space with the operator who is in turn involved in training the robot which provides information on the operator's posture to maximize the ergonomics of the workstation.

RESEARCH PROJECT - CODE N. 3

"Methods and software systems for the control of multi-axis machines"

Research structure: Department of Engineering and applied sciences

Duration of the grant: 12 months

Scientific Area: 09 – Industrial and information Engineering

Academic recruitment field: 09/A2 – Applied mechanics

Academic discipline: ING-IND/13 – Applied mechanics

Scientific Director: Prof. Paolo RIGHETTINI

The research project deals with the analysis of the methods and of the software systems for the control of machines having several axes of motion.

In this case, the optimization of the control of such systems both from the point of view of the method used and from the point of view of the software systems for the relevant implementation, is very important to guarantee high performances of the machine.

In the context of the project, it is expected to accurately analyze the state of art of the methods and of the software systems for the control of multi-axes systems; then the relevant characteristics will be evaluated according to the kind of machines and to the kind of application. Afterwards, an implementation activity on some selected test cases is expected.