



PhD in INGEGNERIA MECCANICA / MECHANICAL ENGINEERING - 39th cycle

**THEMATIC Research Field: INNOVATION FUNNEL AND INTELLECTUAL PROPERTY
STRATEGY PERFORMANCE DEFINITION, THROUGH TRADITIONAL AND AI-SUPPORTED
PATENT DATA ANALYSIS, INCLUDING INVENTION ASSESSMENT AND COMPARISON**

Monthly net income of PhDscholarship (max 36 months)

€ 1400.0

In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity

**Motivation and objectives of the research
in this field**

The research is sponsored by ABB S.p.A. and aims at strengthening data and information available in the earliest stages of the product development process to support decision-making along the innovation funnel within the perspective of ISO 5600x standards on Innovation Management. A key information source for such analysis will be the documentation of the company's Intellectual Property production, from novel ideas reporting to patent application and maintenance. Further, there is an important amount of public information about the Intellectual Property of competitors and partners, to be taken into consideration and benchmarked. Patent valuation and more generally IP portfolio analysis have multiple motivations in industry, such as seeking competitive advantage, market intelligence, strategic planning, investment decisions etc. Traditionally, such activities are carried out by bibliometric data analysis, comparisons with market valuations of similar patents, and option-based techniques. However, those techniques suffer from subjectivity, neglect intangible assets such as the technical know-how of the company, nor they consider the company's strategic assets and take into very limited account the technical information about the inventions in the field. This research intends to build on the combination of the technical analysis of the information contained in innovation reports and related patenting processes with the innovation context to create and



	validate a new model for innovation funnel performance assessment, also exploiting the emerging AI-based solutions for IP classification and technology landscaping.
Methods and techniques that will be developed and used to carry out the research	<p>The research shall be conducted as a sequence of descriptive and prescriptive studies that could be adapted based on the specific gaps and findings that will emerge along the development of the activities.</p> <p>The research project is divided into the following milestones:</p> <ul style="list-style-type: none"> - A review of the current methods used to evaluate the R&D performance in terms of production of IP (ideas, know-how, patents, technical publications), Return on Investments in IP generation and maintenance, and impact in innovating product portfolio. The search should also include an overview of relevant Natural Language Processing and AI-based technologies, to extract the core meaning of the patented ideas and the technical publications. The review shall be carried out following the PRISMA guidelines, and taking into account valuation guidelines defined in the standards ISO 5600x; - Analysis of ABB innovation process, success stories and abandoned projects to recognize the most influential technical and contextual factors driving decisions along the innovation funnel and their appropriateness; - Formulation of a set of indexes for the early assessment of innovation ideas within the ABB context and for monitoring the performance of their innovation funnel. <p>Definition of software tools suitable to support the information retrieval, extraction and assessment;</p> <ul style="list-style-type: none"> - Application of the proposed indexes and tools to ABB case studies.
Educational objectives	<p>The position is open to MSc graduates in any industrial engineering study program (e.g., mechanical, energy, electrical, electronic, automation, management etc.). The educational objective of the research is to train the candidate in the quantitative and qualitative analysis of inventions and technologies, combining deep-level knowledge about their technical features with the characterization of the context of their potential applications. In turn, this involves, among others, system</p>



	modelling, functional modelling, information extraction from structured documents, pattern recognition in innovation dynamics, trend analysis and trend extrapolation.
Job opportunities	Job and career opportunities include professional outlets in all sectors, both public and private, related to technology transfer and business development. For example, Technology Transfer Manager, Business Development Engineer, Process & Technology Transfer Engineer, R&D Engineer, and innovation consultant. The PhD experience also prepares for a research career in academia or research centres. Our last survey on MeccPhD Doctorates highlighted a 100% employment rate within the first year and a 35% higher salary, compared to Master of Science holders in the same field.
Composition of the research group	1 Full Professors 2 Associated Professors 3 Assistant Professors 0 PhD Students
Name of the research directors	Prof. Gaetano Cascini

Contacts
R&D and IP experts from ABB S.p.A. will participate in the research activity.
For questions about research, please contact gaetano.cascini@polimi.it .
For questions about scholarship/support, please contact phd-dmec@polimi.it .

Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad	
Amount monthly	700.0 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
Financial aid is available for all PhD candidates (purchase of study books and materials, funding



for participation in courses, summer schools, workshops and conferences) for a total amount of euro 5.707,13.

Our candidates are strongly encouraged to spend a research period abroad, joining high-level research groups in the specific PhD research topic, selected in agreement with the Supervisor. An increase in the scholarship will be applied for periods up to 6 months (approx. 700 euro/month- net amount).

Teaching assistantship: availability of funding in recognition of supporting teaching activities by the PhD candidate. There are various forms of financial aid for activities of support to the teaching practice. The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations.