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INNOVATIVE MOBILE POWER STATION FOR FIELD ROBOTICS: SYSTEM DESIGN AND COMMERCIAL PERSPECTIVES

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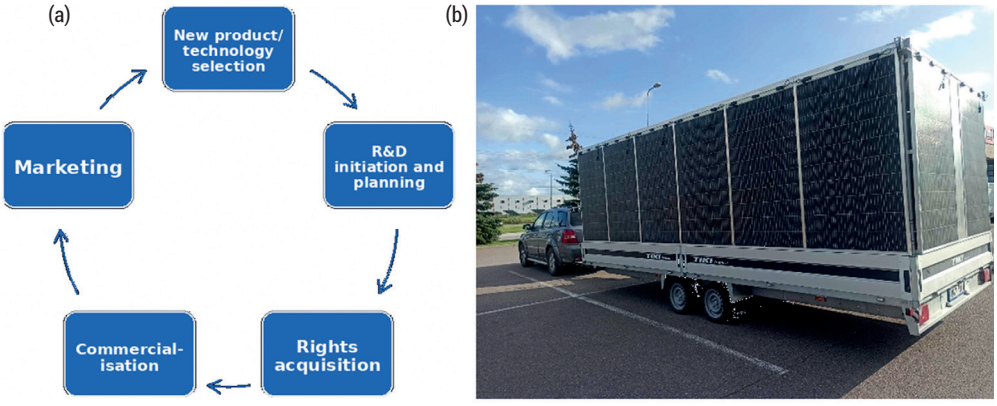
Abstract – Innovation plays an important role in all fields, including agriculture. Intellectual property, specifically industrial property is a key driver of innovation and economic growth. Effective commercialization of industrial property can stimulate economic activity by attracting investment, creating additional jobs, and fostering the development of new products and services. This research examines the commercialization prospects of a novel autonomous, mobile, environmentally friendly energy station developed at a university. The process begins with obtaining industrial property protection rights and understanding their management, which involves a series of legal procedures, and then initiating technology transfer. This is an academic technology transfer from a university to a commercial enterprise. To support this process, a licensable technology portfolio must be compiled, centered on the licensing asset, which may include one or more patents, utility models, and know-how. Naturally, the selling points of the commercialized product or technology must be clearly articulated. The mobile energy station comprises a solar power plant (non-dispatchable, primary) with a maximum total power of 6.8 kW, a biomethane-powered generator (dispatchable, secondary), an energy storage system with a total capacity of 14.4 kWh, and a rapid battery swapping and charging device for an agricultural robot. This hybrid solution (solar + generator) ensures continuous operation even under adverse weather conditions. The battery swapping and charging device includes a platform alignment mechanism, a powered trolley for transferring the battery, and an automated locking and unlocking mechanism. The energy station is automated and controlled by a programmable logic controller (PLC) and several embedded microcontrollers. The central PLC (SIMATIC) coordinates process-control functions: operation of the solar tracking drives, battery state of charge, generator operation, and wireless communication with approaching robots.



Product commercialisation model (a) and mobile energy station (b)

Keywords – Autonomous systems; environmental protection; intellectual property; off-grid power supply; renewable power systems; sustainable innovation; techno-economic assessment

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