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A comparison of best practices of public and private support incentives for the remanufacturing industry

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Abstract

In the context of resource constraints and the negative environmental and social impacts of the linear “take-make-dispose” pattern, remanufacturing offers a promising solution for the transformation of end of life (EOL) goods into products with equal or superior specifications and lifetime as compared with newly produced goods. The increasing success of this new industrial paradigm results from the possible combination of production costs reduction and profit maximization as well as efforts to increase environmental performance and harvest social benefits, such as job creation. However, a large number of countries faces challenges in building a valuable process because of the lack of communication between public and private stakeholder and the remanufacturing industry.
This paper intends to identify and classify the key stakeholders in categories and define the type of actions taken in selected countries to foster remanufacturing. Guidance for both public and private actors are suggested for the development of specific remanufacturing industries.

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Keywords: Remanufacturing business models; circular economy; public and private incentives; best practices

1. Introduction

The dynamic between seemingly unrestraint production and mass-consumption reached a level far beyond planetary boundaries so that safety for the environment and all beings that inhabit it is no longer guaranteed. Biodiversity loss, climatic changes, ocean acidification and dysfunctional nitrogen cycles are a few examples that will lead to nature’s inability to cope with ecological imbalances and might therefore jeopardize water, food and raw material supply [1–3]. At the same time societies have to face issues of social inequality and questions of poor living conditions, for which solutions often include increased ecological footprints [4]. Radical changes in both production patterns and consumption habits are a necessity if the present generation wants to ensure a future with similar or improved living conditions without jeopardizing growth and economic stability in the present.

Circular economy is a concept that aims at such change; following nature’s principle of decomposing and recreation and the knowledge about limited resources it includes different sustainability strategies under the model of thinking through a product’s life-cycle from beginning to end-of-life strategies [5]. Circular Economy can include today’s-goods-are-tomorrow’s-resources-strategies or life-prolonging measures as long as it aims at closing the loop between production and disposal so that all material is reused, remanufactured or recycled.

Remanufacturing is recognized to be an effective strategy in closing the loop by enhancing resource efficiency through reuse of components and products as input material and guarantees competitive advantages by significant price reductions in comparison to a newly produced product. A variety of definitions for remanufacturing is offered, like the one formulated by the British Standard Institute. But for this paper a more detailed definition is chosen. Widera defines remanufacturing as an "industrial process in which a product that no longer satisfies the initial purchaser or first user, is transformed into a like-new or next generation product in terms of functionality, performance, lifetime and warranty. This is achieved through collection, incoming inspection, disassembly, cleaning, review and sorting, reconditioning, replacement, reassembly and testing of the product” [6]. The

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remanufacturing industry is currently limited to a few countries and activity sectors as aerospace and automotive [6–8]. Research mostly focus in industry-specific improvement proposals, whereas influence of public and private external stakeholders on national remanufacturing industry remains with little academic attention.

This paper intends to identify private and public support measures for remanufacturing industry in handpicked nations from the Americas, Europe and Asia, leading to a qualitative results comparison.

2. Development of the remanufacturing industry in selected countries

2.1 Remanufacturing development in the Americas

The United States of America (USA) is the largest producer of remanufactured goods with a sales volume amounted to at least $43.0 billion in 2011 compared to $37.3 billion in 2009 [8]. The highest share of remanufacturing production is comprised by Small and Medium-sized Enterprises (SME). Globally, an estimated number of more than 100.000 enterprises generate around $100 billion with a workforce of approximately 500.000 employees [9]. USA possess in contrast with other regions a low number of environmental laws indirectly or directly affecting remanufacturing. The main actor in environmental legislation is the Environmental Protection Agency (EPA), and mostly acts on customer preferences to generate change, as in the Safer Choice program [10]. However, support has been given to the industry as soon as 1998 with the creation of a label “Remanufactured in the USA” by the Federal Trade Commission [11]. This public recognition does not represent a certification standard, but according to the United States International Trade Commission (USITC), quality standards are autonomously ensured by motivated Original Equipment Manufacturer (OEM) following a business-oriented approach [8]. This assumption cannot be contradicted by the success of the country having the highest intensity of remanufactured products worldwide. Pioneer companies such as Caterpillar for the Heavy Duty off Road (HDOR) sector are very skilled in promoting the strategy as of one of their major keys to success for customers worldwide, constructing their trust and sustaining their expectations. The public support to the remanufacturing companies is not decided at the federal level, but 20 states are offering direct assistance by opening specific public procurement credits or offering tax subsidies [12]. Another example of public support to the remanufacturing industry is enacted by the public law 114-65, mandating all federal agencies to consider remanufactured parts for maintaining public vehicles fleets [13, 14].

Brazil has a remanufacturing industry in the domains of automotive parts, HDOR equipment and IT products, which is performed mainly by thousands of SMEs employing fewer than 20 operators. No less than 18,000 firms perform remanufacturing of ink cartridges, representing 25% of the broader printing industry companies count. However, in the automotive parts sector, a few large multinational companies account for 75% of the market, while 2000 SME are sharing the remaining 25% [15]. In 1991 and 2006, the Ministry of Development, Industry and Foreign Trade (MDIC) draw a concept of used and remanufactured products but forbids commercialization of used products, that can only be donated, with ordinances DECEX 8/1991 and DECEX 235/2006 [16, 17]. The country enacted its first environmental legislation in 2010 with the National Policy of Solid Residuals (PNRS) [18] to organize the management of waste and enforcing principles of responsibility of manufacturers, importers and distributors to manage the EOL of their products. By demonstrating paths to economical valuation of waste, the PNRS can indirectly benefit the development of its remanufacturing industry. Private initiatives are taken for the definition for remanufacturing by the Brazilian Association of Technical Standards (ABNT) NBR 15296 standard for road vehicles in 2006 [19]. It defines remanufactured parts as “an original used production part or component, characterized by having undergone an industrial process by the original manufacturer or in an authorized establishment of this manufacturer, to restore the original features and technical functions” [20]. In an effort to ask for the facilitation of remanufacturing activities by legal support, the Brazilian Association of Auto Parts Manufacturers (SINDIPECAS) submitted a report in 2010 to the Federal House of Representatives to ask for regulations in their favor. The same year, an inter-ministerial workshop was created by the Executive Secretariat of Foreign Trade Chamber (CAMEX) to develop a national policy for the import and export of remanufactured goods [20]. The National Association of Auto Parts Remanufacturers (ANRAP) is actively promoting remanufacturing by organizing explicative workshops. In the context of the Brazilian industry, economic aspects are exclusively stated by Brazilian companies as a motivation for implementing new processes, such as remanufacturing. Efforts towards a better communication on the financial opportunities offered by closed loop strategies could act as an enabler for remanufacturing [21].

2.2 Remanufacturing development in Asia

Remanufacturing in South Korea mainly consists of automotive parts, accounting for 80% of all activities, followed by IT equipment with 17%. Sporadic activities take place in the HDOR, medical equipment and defense sectors. Overall, the remanufacturing sector increased in value by 11% yearly in the last 5 years while the number of firms and employees decreased by more than 30% in the same period [12]. It has been the world’s first country to give a legal framework for the quality certification of some remanufactured automotive parts and electrical and electronic items, as soon as 2006 by the Korean Agency for Technology and Standards (KATS) [22, 23]. In 2010, the Act on the Promotion of the Conversion into Environmental-friendly Industrial Structure was enacted for supporting quality certification and R&D efforts of environmentally friendly manufacturers. The Korean government intends to support remanufacturers, expand the market and reassure the customers buying remanufactured products [24]. Professional research agencies are supported by universities and public research institutes. The private Korean Automotive Technology Institute (KATECH), for example, is in charge of the further development of the automotive parts