

# Innovation in the Manufacturing Industry

## Utilizing the Crowd Concept

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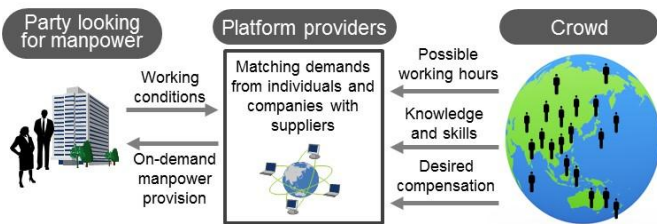
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“Crowd” is a term referring to a large, unspecified number of online-accessible individuals and corporations. Crowd-related businesses such as crowdsourcing that procure human resources from the crowd and crowdfunding to procure funds for projects from the crowd are growing. Hitachi Research Institute has been researching the potential use of the crowd in the manufacturing industry from three perspectives, namely, human resources, money, and goods.

### 1. Human Resources: Acceleration in the Use of Crowdsourcing in the Manufacturing Industry

#### 1.1 On-demand Use of Individual or Small and Medium-sized Company Manpower

Crowdsourcing is a coined word combining “crowd” which refers to providers of manpower (individuals and corporations) and “outsourcing”. Individuals and corporations from around the world register possible working hours, knowledge and skills, and desired compensation, etc. in an on-line site operated by platform providers that connect those searching for manpower with the crowd. Companies looking for manpower procure human resources meeting their demands as needed (Fig. 1).

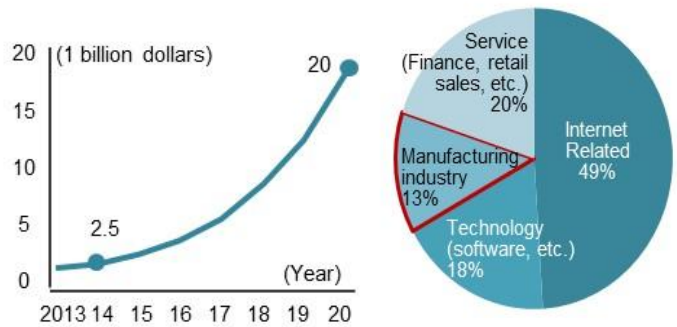


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Figure 1. Basic Crowdsourcing Scheme

Diversified human resources with different nationalities, academic backgrounds, work experiences, qualifications,

and skills are registered, and corporations can procure inexpensive and talented human resources beyond national borders. According to the World Bank, the global transaction value in crowdsourcing in 2014 was approximately 2.5 billion dollars (approximately 300 billion yen), and it is expected to reach approximately 20 billion dollars (approximately 3 trillion yen) in 2020. Currently, while most of the jobs are Internet-related such as website design and software development, the use of crowdsourcing in the development field of the manufacturing industry is expected to expand (Fig. 2).



Prepared by Hitachi Research Institute based on data from the World Bank

Figure 2. Global Transaction Value of Crowdsourcing and Sales Composition by Business Type (2012)

#### 1.2 Increasing Use of Crowdsourcing in the Manufacturing Industry

The use of crowdsourcing in the manufacturing industry is increasing in research and product development work and design work for which deliverables are easily traded online. While the use of crowdsourcing is growing in relatively small scale product fields (daily commodities, home appliances, etc.) and the development of embedded software, crowdsourcing is recently beginning to be used for large size projects including development of next generation transportation systems in the State of California, U.S. (Table 1)

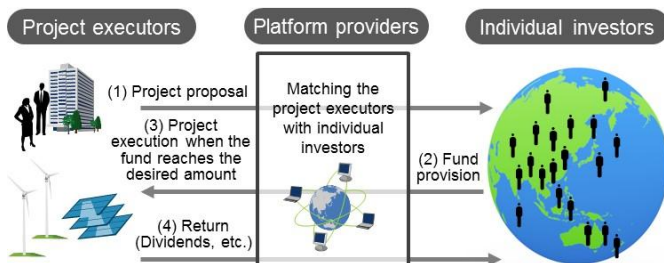
Table 1. Crowdsourcing Example in the Manufacturing Industry

	Company Name	Main Crowdsourcing Contents	Product Field
Product Planning	Ryohin Keikaku (Japan)	Calling for application of product ideas in consumer participation type development website and creating the products	Household products, clothing, etc.
	Hyperloop Transportation Technologies (U.S.)	Researchers and engineers who will engage in the development of next generation transportation systems in the State of California	Next generation transportation systems
Research & Development	P&G (U.S.)	Researchers of materials and manufacturing technology	Daily commodities, snacks
	Local Motors (U.S.)	Automobile designers	Automobile
Design	GE (U.S.)	Designers of engine parts for aircraft and home appliances	Machine components, home appliances
	Sony (Japan)	Voice recognition software data	Home appliances

Prepared by Hitachi Research Institute based on data from various press materials

## 2. Money: Increase in the Use of Crowdfunding Mainly for Renewable Energy

Crowdfunding is a fund procurement method where the provision of funding is requested from the crowd through the Internet. The projects are executed once a certain amount of funds is gathered (Fig. 3).



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Figure 3. Basic Crowdfunding Scheme

Since there are many investors with different levels of risk tolerance among the crowd, the potential of fund procurement for small-scale high-risk projects that cannot procure funds from conventional financial institutions such as banks has been expanding. Crowdfunding is experiencing dramatic growth and according to the World Bank, the amount of funds procured by crowdfunding (worldwide) in 2015 reached 35 billion dollars (approximately 3.9 trillion yen).

With renewable energy in particular, a system of

purchasing electricity has been established and therefore business schemes are being easily formulated and the market is expanding (Table 2). Since individual investors evaluate the business schemes of power producers from various perspectives in the contribution of funds, whether or not the proposals can acquire empathy from potential investors in aspects such as contribution to society is important, instead of simply the possibility of project success and dividends.

Table 2. Renewable Energy-Related Crowdfunding Platform Providers

	Renewable Energy Type			Fund Procurement Amount
	Solar	Wind power	Hydro-power	(1 million euro)
Trillion Fund (U.K.)	○	○	○	104
Abundance (U.K.)	○	○		16
Windcentrale (Holland)		○		15
Village Power (U.S.)	○			5

Prepared by Hitachi Research Institute based on data from Renewable Energy Crowdfunding Conference 2015

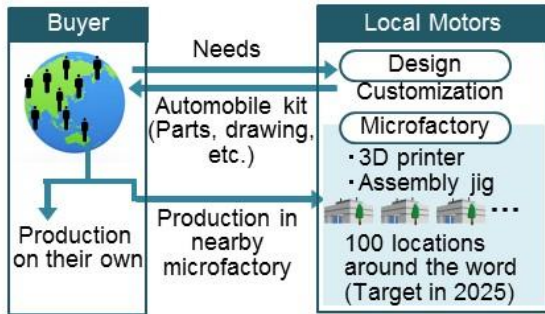
## 3. Goods: Assets as Crowd Realized by Sharing Manufacturing Equipment

Since many of the assets owned by individuals and small and medium-sized corporations are not effectively utilized, one approach involves targeting more effective use by having others share the assets. For example, the utilization rate of private cars is said to be approximately 5%, so one service is attempting to improve asset efficiency by sharing private cars. Each asset owned by individuals and small and medium-sized companies can be regarded as a component of the crowd, and this turns the asset into a crowd by sharing.

In the manufacturing industry, a business model of releasing manufacturing equipment owned by a company to the public and having individuals and corporations use the equipment is possible; however, no companies have realized such a business model yet.

As a case example similar to the above business model, Local Motors from the U.S. released equipment from their plants to automobile owners. Owners purchasing automobile kits sold by Local Motors are able to create

parts in plants called microfactories by using molding machines (3D printers) and assemble their own customized cars (Fig. 4). Local Motors is scheduled to establish 100 microfactories around the world in 10 years.

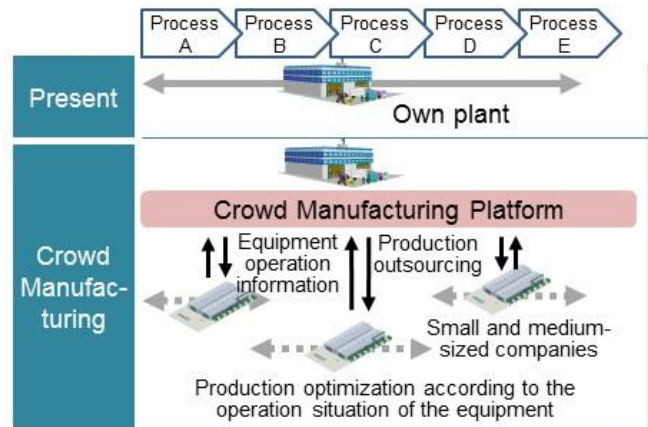


Prepared by Hitachi Research Institute based on data from Local Motors

Figure 4. Local Motors Automobile Design and Manufacturing Process

#### 4. Challenge to Crowd Manufacturing from Sharing Manufacturing Equipment

Progress in crowd usage in terms of human resources, money, and goods will eventually lead to “crowd manufacturing” (Fig. 5) that achieves efficient production by regarding the manufacturing equipment and manpower of each plant as the crowd. In crowd manufacturing, an increase in traceability and securing quality assurance in addition to the establishment of trade markets of manufacturing equipment and manpower will become necessary for the manufacturing industry. Furthermore, manufacturing in small and medium-sized companies can be deployed more easily than before through crowdfunding. Hitachi Research Institute has been jointly promoting projects with Hitachi’s Research & Development Group, and Hitachi Research Institute is planning to contribute to business creation by deepening its research of crowd manufacturing business models including services in particular.



Prepared by Hitachi Research Institute

Figure 5. Concept of Crowd Manufacturing