

TRENDS

The Nature of Management Platforms in Current “Industrial Paradigm Shifts”

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Business and other areas of society are undergoing major changes as digitalization builds momentum. Amid rapidly changing consumer values, companies are faced with a situation that diverges from the current business models and successful practices of the past. Kenichiro Senoh, Director and CEO of the Industry-Academia Collaboration Initiative, explains how this situation is beginning to accelerate shifts in industrial paradigms. Known as the author of “*Gijutsuryoku de masaru nihon ga naze jigyo de makerunoka* (Why does Japan’s superior technology lose out in business?),” Professor Senoh gives his views on macro trends and corporate management, putting the question in terms of both the background to paradigm shifts and the sort of management fundamentals that are possessed by those companies that thrive in such an environment.

Three Prerequisites for a Paradigm Shift

A look at recent global trends gives the sense that shifts in industrial paradigms have suddenly started happening all at once. I first identified the potential for a paradigm shift some 15 years ago, but it is only now that all of the conditions for such an acceleration are in place.

A paradigm shift occurs when the three elements of technology, regulatory systems, and sociocultural change in mutually interacting ways. While progress may occur in technology on its own, the paradigm, which is to say the reference frameworks (the frameworks for thoughts based on “common sense”), will remain unchanged in the absence of regulation or impetus from

regulatory systems and a basis for encouraging or accepting change in the wider culture.

Normally, industrial paradigm shifts or movements refer to things on the scale of the 19th century industrial revolution, for example. Innovations feed off each other such that they emerge in a steady stream before reaching a point where society or industry as a whole suddenly experiences major change at an accelerating rate.

In practice, however, innovation too is subject to the interaction of technology, regulatory systems, and sociocultural change, in turn causing changes in society as a whole. One example involving cars is how US auto manufacturers adopted larger engine displacements in the period of economic growth that followed the end of the Second World War. When this resulted in worsening air pollution, a shift emerged in public



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attitudes in favor of environmental measures, culminating in the introduction of strict controls in the form of the 1970 Clean Air Act Extension (also known as the Muskie Act). Compliance with this regulation was achieved through technology and low-emission vehicles became the norm. This was followed by the public shifting their focus toward measures for reducing traffic accidents. The response was the development of the three-point seatbelt, which became mandatory after the patent for the invention was made freely available, a situation that encouraged a shift toward public concern about safety.

It was the appearance of just such a set of major drivers for change across these three elements, what you might call a convergence of circumstances, that led me, someone who studied individual innovations, to once again start talking about a paradigm shift across the entire industrial ecosystem.

Creating Value through Cyber and Physical Interactions

By these circumstances, I meant cyber physical systems (CPSs) in the area of technology, the Sustainable Development Goals (SDGs) in the area of regulatory systems, and the concept of "services, subscription, sharing and circular" (SSSC) in the area of culture.

Summarizing each of these in turn, CPSs clearly equate to the technical concepts that underlie initiatives such as Germany's Industrie 4.0, the US's Industrial Internet, and Japan's Society 5.0. From an industrial society where value is created by the technologies of physical things and an information society where value is created by the digital ("cyber") technologies, through an era in which physical and cyber, analog and digital, and real and virtual interact with each other and converge,

we are starting to move toward an era in which customer value (social value, industrial value, lifestyle value, and so on) is generated by CPSs.

For example, we can now look forward to improvements in predictivity as well as in productivity through the concept of digital twins, which is central to CPSs. Predictive maintenance has become possible by collecting physical data using sensors and analyzing it using artificial intelligence (AI) to identify signs of potential faults. The applications go beyond equipment and other social infrastructure. There is also scope for applying predictive maintenance to our own health.

There is also the prospect of mass customization. If everything from ordering to the production line is seamlessly connected by CPSs, it becomes possible for products customized to individual users to be produced effectively and efficiently. A capability for optimal production tailored to individual needs should do away with the unnecessary use of resources that comes with having large amounts of waste.

SDGs as a Rule-making Resource

The second circumstance is the SDGs. These 17 development goals set by the United Nations with the aim of creating a sustainable society characterized by diversity and inclusion represent a lofty ideal with which nobody could disagree. Moreover, these development goals are becoming an accepted part of future society. What also can't be ignored is that the SDGs have the potential to be a rule-making resource in business. The 17 goals are currently broken down into 169 specific targets, and the likelihood is that they will give rise to international standardization and to certification and auditing business. Failure to pass this certification carries a risk of exclusion from

global supply chains. Accordingly, while the SDGs represent lofty goals, I would like to point out that their other aspect as part of strict European-led industrial policy means they have the potential to pose a significant risk to Japanese companies. That is, however good their technology might be, companies that are not in step with the SDGs risk being cut out of global markets.

There is currently a lot of interest in "environmental, social, and governance" (ESG) investing that selectively directs investment toward companies that pay attention to these factors, and this is part of the same trend. This calls on companies to correctly decipher these matters and deal with them appropriately.

When companies incorporate the SDGs into management, they need to switch from conventional corporate social responsibility (CSR) reports to putting out this information in the form of SDG reports by way of integrated report documents. It seems that only some companies in Japan are aware of this, Hitachi among them. I would like the corporate sector to take note of how aspects that relate to the SDGs and other regulatory systems are causing major changes in the industrial paradigm.

Rapid Sociocultural Change, with a Shift from "Buying & Owning a Product" to "Using & Subscribing to a Service"

The third circumstance is SSSC. This is an acronym I have coined myself to represent a major sociocultural trend. The transition to a service economy and the shift from "buying & owning a product" to "using & subscribing to a service" has been underway for some time, with one example being the IT industry changing from selling hardware or software packages to supplying cloud services. Businesses that work on a subscription model

(charging for use) have also recently emerged in the automotive industry. As advantages for users include lower operating costs and always having access to the latest version, the practice is likely to expand in the future.

The concepts of “sharing” and “circular” can be described as having a twin relationship. Second-hand markets on the net, for example, are not only circular businesses based on reuse, but also sharing businesses by their very nature. The younger generation think of them as being like sharing a wardrobe full of millions of items. I also heard recently about how the sharing of underwear is not a weird practice in university students’ shared accommodation these days, which left me astonished at how far things have gone. This shows how a mentality of sharing and reuse has spread through the younger generation in particular.

Sharing also has a strong affinity with the service economy, and the service model of using networking to generate business value from unused or pre-used resources that have no value on their own has emerged all at once.

Meanwhile, industrial culture is also changing in response to this trend. The transformation of industry into services along with subscription and sharing is no longer news in the business-to-business (B2B) sector. What we in Japan call the “vein economy” (a circulatory economy involving recycling) is also becoming a treasure trove of innovation. In other words, it is worth noting that the culture of industry as well as of wider society is undergoing major changes.

Intellectual Property Management that Anticipates Changes in Industrial Ecosystems

With the circumstances surrounding these three elements in place, a shift in the industrial paradigm

begins. The SSSC trend, in particular, has the potential to transform industrial/manufacturing ecosystems. While I believe Hitachi is alert to this and has taken various steps in response, thriving in an era of massive change will require a rethink not only of business strategy but of company-wide strategy, with measures to reform and strengthen the fundamentals and foundations of the company. Intellectual property, manufacturing, and human resource development (the subjects of this issue of *Hitachi Review*) involve fostering and using knowledge, goods, and people, and are essential elements in terms of providing the basis for corporate competitiveness.

First of all, the intellectual property sector is being called on to confront an era in which CPSs generate value from intellectual property such as data to which the rights have been given up. This involves not only a shift from the past focus on intellectual property rights to a data-centric approach, but also requires strategies with a broad scope that address how companies can generate and utilize knowledge. That is, the questions of how to generate knowledge in-house or acquire it externally (with knowledge being treated as a management resource), how to combine these to put this knowledge to use, and how to deliver it to the outside world. We are now entering a time when intellectual property management is no longer just a narrow question of securing rights but means managing the acquisition and use of knowledge resources.

It is also a time of using CPSs as a base for forming cross-industry alliances with companies with which you previously had no points of contact. For companies, it has become vitally important to address the issues of how not only business ecosystems but also industry-wide ecosystems will change, and in what ways should they be changed. Appropriate, forward-looking

intellectual property management is essential for deciding which businesses to pursue, who to partner with to achieve this, and for building an optimal relationship with your chosen partners. Future intellectual property strategy will be all about addressing these issues.

What is important in terms of industrial ecosystems and business models is not market share but who is in a position to lead. It is essential to understand that intellectual property management is an important element when it comes to designing business models that take this initiative.

Increasing the Number of Allies and Partners in Manufacturing Technology

CPSs are also bringing big changes to manufacturing. A characteristic of manufacturing during Japan's Showa period (1926 to 1989) was a combined emphasis on products that were standalone or complete in themselves, technology being vertically integrated and close-fitting/grading, and an approach to business of being self-sufficient and hoarding resources. How to reconcile these with the next-generation paradigm is an important issue. While this will clearly include work on the use of digital technology for aims such as improving production efficiency, achieving more reliable quality, and creating smart factories, it is also likely to require progress on optimizing production and value chains, which in the case of multinational companies will include their overseas operations.

However, along with it being only natural for companies to seek to make internal improvements on their own behalf, this will also likely be accompanied in the future by their needing to give more thought to considerations of openness. While much has been made of open innovation in recent times, this has mainly been of an inbound nature

that only extends to the bringing in of knowledge from outside. Outbound knowledge transfer also needs to be considered. Putting knowledge resources out there rather than hoarding them in-house can be an opportunity to take the initiative in the industrial ecosystem. In other words, there is a need to overcome the instinct for hoarding resources as well as that of self-sufficiency.

Obviously, the question of what to open up to the outside world is one that demands strategic study. In doing so, however, I would like to suggest that one should avoid thinking in terms of strengths and weaknesses. Strengths and weaknesses are tactical questions that arise in the context of the existing model. In a time of innovation, however, when the model itself has changed, and at a time when the industrial paradigm is going through a major shift, past strengths and weaknesses lack meaning however much you analyze them. Better to think in terms of your company simply having characteristics. This way, strategy is all about asking what needs to be done to turn those characteristics into business strengths, or to avoid their becoming weaknesses. This approach to strategizing itself calls for innovation.

Hitachi, meanwhile, has successfully taken its railway business global and I expect you have learned much from the manufacturing practices of overseas companies where the culture is different to that in Japan. From this, I hope you can take insights and lessons for moving to the coming model.

Incidentally, is it true that, once goods are made, all that is left is to sell them? As noted above, the production of goods can also be followed by making them available to others (by adopting a service model) or by using them in your own service solution businesses. Put the other way, why not take these two ways of using goods into account at the manufacturing stage?

Thinking about Human Resource Development in Terms of an Agricultural Metaphor

Openness is also a key factor in human resources. Rather than sticking to a tradition of promoting from within (self-sufficiency), an “inbound” approach of bringing talent in from outside is also important. More important still is an “outbound” approach of building strong relationships with people who leave the company. This is another example of winning friends and allies.

With regard to education, and speaking from my own many years of experience with graduate schools and in-house training at companies, my impression is that the most important venues of all for human resource development are the home and workplace, which is to say the places where life actually happens. Next in importance is interaction with all sorts of different people, where stimulation and insight are brought about. In third place comes practical training conducted off-site.

“Corporate culture” is an expression used in English. In Japanese, the characters used to express this concept are those meaning “wind” and “soil,” which is to say the environment that influences people’s attitudes and practices. This means that the basis of our thinking about the fundamental nature of human resource development uses an agricultural metaphor. In other words, the underlying idea is that we grow ourselves the way a plant does, flowering and then bearing fruit. It is education that facilitates this process, while human resource development refers to its overall governance. The mistake we make is to try to standardize these and stamp them out from a mold, as in the long-standing industrial metaphor. How to strike a balance between the ordinary person, who says the same things as everyone else,

and the eccentric, who only says things that are different from everyone else? Innovation means doing something different from the norm. In other words, we should push individuality. However, the common sense of a company employee is also needed. For this reason, too, unless we let the air in and fertilize the soil, we will fail to bring forth people with individuality in any real sense.

To foster knowledge, goods, and people, we live at a time when, rather than considering the job done as soon as they are finished, it is important too to look at these things in terms of how we can put them to use. The reason is because this is nothing other than the basis of corporate management and business strategy.