

# Technology Succession: Open and Close Strategy

Hironao Kaneko, Tokyo Institute of Technology

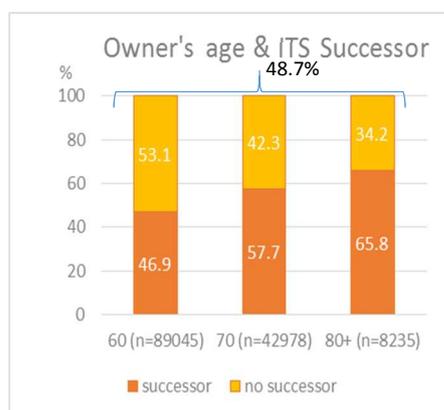
## 1 Introduction

In Japan, we experience social change in a decrease of birthrate and an increase of aged people. Imbalance of generations affects the sustainability of the society. Japanese development is due to the manufacturing industry that produces and exports cars, electrical appliance and machinery.

The rush of retirement and the decrease of young workers cause lack of the working force and the breaking technology succession in the workplace.

In Japan, the baby boom was after the World War II, from 1947 to 1949. Baby boomers is so called, the generation of folk, Dankai-Sedai. This generation became workers in 1970s. The Japanese experiences the rapid economic growth in 1970s. The retirement is from 60 to 65 years old. In 2018, baby boomers become aged over 60 years old and many of employee have already retired. In 2025, the baby boomers will become over 75 years old. Entrepreneur owners will also retire and give up their business. <sup>1</sup>

The report of the Ministry of Economy, Trade and Industry (METI) says that no successor exist at 30 percent of 1,270,000 entrepreneurs. The smaller entrepreneurs supports Japanese manufacturing industry. The 48.7% of owners of the smaller entrepreneurs over 60 years old do not have successors.<sup>2</sup>



[Figure Owner's Age and Its Successor]

(Source Figure 2-6-4, White Paper on Small and Medium Enterprises in Japan)

<sup>1</sup> The large discontinuance-of-business disappearing 22 trillion yen in GDP, Nikkei News, 2 August 2018; Frontier of education, stopping extinction of technique of skilled worker, Takumi, Nikkei News 18 May 2018.

<sup>2</sup> The Small and Medium Enterprise Agency, 2018 White Paper on Small and Medium Enterprises in Japan, [<http://www.chusho.meti.go.jp/pamflet/hakusyo/>]

The rush of retirement and discontinuance of the business urge many owners to give up their profitable business. Technology nourished in the entrepreneur disappear by discontinuance of the business.

The purpose of this paper is surveying legal undertakings to support technology succession in Japan and examine the properness of these undertakings. This paper compares open and close strategy of intellectual property.<sup>3</sup> The result of the analysis may apply to foreign countries that confront the aging society and loss of high skilled engineers.

In this paper, a predecessor means the one holding technology. The successor means the one receiving the inherited technology.

## 2 Succession of Business and Its Need

### (1) Dual Sides of Discontinuance

Discontinuance of business is desirable economically. Re-distribution of property and human from liquidated entrepreneur to other business entity. The economic metabolism promote new business.

However discontinuance of business prevents the technology succession when a worker a new job other than previous one. It also means the distinction of trade secrets of technology. Therefore the succession of business has important role of preserving employment and of inheriting technology of engineer.

The technology hold in smaller enterprises is essential for manufacturing industry. Japan Patent Office publish the statistics of the patent-application. In 2015, the applications by the smaller entrepreneurs is 43.4% of the application by all entrepreneurs. Sum of applications by the small entrepreneurs and individuals, the ratio of applications other than large-scale corporations is 44.9%.<sup>4</sup>

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<sup>3</sup> "Open and close strategy" is used in intellectual management. See, Koichi Ogawa, OPEN & CLOSE STRATEGY ZOHOKAITEIHAN (SHOEISHA 2015)(in Japanese), at 337.

<sup>4</sup> This estimation is based on the data in 2015. The application by all entrepreneurs is 310,166. The application by the patent-system utilization higher rank entrepreneurs is 175,616. The difference of two number is 134,550. It represents the number of application by SMEs. The number of application by the individuals is 8,544. The total number of application is 318,721. The ratio calculated by these data. [[https://www.jpo.go.jp/shiryo/toushin/nenji/nenpou2018\\_index.html#touki\\_shiryou](https://www.jpo.go.jp/shiryo/toushin/nenji/nenpou2018_index.html#touki_shiryou)] Data Source, Japan Patent Office, The Annual Patent Report 2018. See, Figure 8, Number of application classified by applicants (individual, entrepreneur, public agency) and Figure 10 Number of application of by the patent-system use higher rank

The high proportion of patent application by individual and small and medium size entrepreneurs means the potential patentable technology is enormous. Technology information not patented is also enormous.

Therefore, technology succession of smaller entrepreneurs is indispensable to keep Japan industry.

## (2) The universality of a technology succession

Technology succession has also the cultural meaning to inherit the tradition. One of the most famous example is Intangible Cultural Heritage certified by the United Nations (UNESCO).<sup>5</sup>

It supports the technology succession focusing on the cultures. The Convention for the Safeguarding of Intangible Cultural Heritage was adopted in 2003. The treaty aims to protect Intangible Cultural Heritages, to encourage consciousness of significance of Intangible Cultural Heritages, and to evaluate mutually.

Japanese government join to the treaty in 2004 and enforced it in 2006. The number of contracting countries is 178 (at July, 2018). The number the Intangible Cultural Heritage is 365 in the world. 21 of them are in Japan (at May, 2017).

Japanese Intangible Cultural Heritages protecting the traditional-handcrafts is as follows. Ojiya Chijimi and Echigo Johfu, a handloom-weaving in 2009 (Niigata Prefecture), the Yuki Tsumugi in 2010 (Ibaraki Prefecture, Tochigi Prefecture) and the handmade Japanese paper in 2014 (Shimane Prefecture, Gifu Prefecture, Saitama Prefecture).<sup>6</sup>

These skills were base technology of Japanese industry in the past.

## 3 The Governmental Support for Industry

### 3.1 Support for Industrial undertaking

Japanese government, METI and the Small and Medium Enterprise Agency (SMEA), provides support of technology succession of technology for industry.

#### (1) Financial Support

There is financial support based on the Law Concerning the Promotion of the Traditional Craft Industries.<sup>7</sup>

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entrepreneurs.

<sup>5</sup> [<https://ich.unesco.org/>]

<sup>6</sup> [[http://www.bunka.go.jp/seisaku/bunkazai/shokai/mukei\\_bunka\\_isan/](http://www.bunka.go.jp/seisaku/bunkazai/shokai/mukei_bunka_isan/)]

<sup>7</sup> The budget in 2017 is 1,110 million yen. See, White Paper, at 375.

Local manufacturing cooperatives and other associations receive financial support to train successor. General incorporated associations etc. receive support for programs to reroute worker and to inherit skill held by. (The law Art. 23)

(2) Support for Business Successions for the Small and Medium Enterprises (SMEs)<sup>8</sup>  
The Law on Special Measures for Industrial Revitalization and Innovation amended in May 2011. It provide support services for business successions provided by approved support agencies in every prefecture. They are Business Succession Help Desks. They provide consultation and advice on business successions.

Business Succession Support Centers were established at approved support agencies in regions with strong demand for supporting business successions.

### 3.2 Support for protecting Intellectual Property

#### (1) Open and Close Strategy

The Japanese government announce the open and close strategy that each entrepreneur can select to protect technology. Intellectual property protection of technology may lead to ensure the succession of the technology.

Patenting is open strategy. Technological information disclosed to the public. However using information is limited to the authorized person.

Another method of open access to the technology is to publish videos recording skills into SNS. A lot of video teach skills on YouTube and Facebook. The copyright restrict duplication of the video contents. However copyright does not restrict to use technology and skills recorded in the video.

#### (2) Support patenting of SMEs

For small and medium enterprises, the government reduce patent fee.<sup>9</sup>  
Since 2018, the patent fee reduce to the half by this support.

The early examination and trial of claim of patent applied to SMEs. The early examination procedure of examination or trial start by production of explanation. The same rule apply to claim for design and trademark by them.<sup>10</sup>

#### (3)(i) Support protection of trade secret by INPIT

"Trade Secret and intellectual property strategy consultation: Trade Secret 110" is the

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<sup>8</sup> The budget in 2017 is 6,110 million yen. See, White Paper, at 384.

<sup>9</sup> The requirements of SMEs provided. White Paper, at 411.

<sup>10</sup> The motion of the early examination are 19,230 and the motion of the early trial are 241 in 2017 fiscal year according to the statistics until the end of January 2018.

one-stop service to support protecting trade secret for SMEs.

National Center for Industrial Property Information and Training (INPIT) provides it since 2015. It provides information and supports SMEs to protect technology by open-close strategy. They select trade secret protection keeping their technology secret or patenting technology.

(3)(ii) The consultation of technology management and time stamp service

INPIT provides consultation of technology management especially managing trade secret.<sup>11</sup> It provides the time stamp service to prove no alteration of electronic document. This service helps to prove technology information kept in secret.<sup>12</sup>

Time Stamp service help those who use technology as a trade secret to prove the right of Prior Use against the patentee who has patent overlapping the technology.<sup>13</sup>

The electronic authentication service exists based on the public authentication system. Users can store electronic document too.<sup>14</sup>

### 3.3 Reduction of taxes

The succession of business is enable to succession of technology. Reduction of taxes imposed at the business succession helps the succession. Taxes of business succession changed in 2018.<sup>15</sup>

The government grace the taxes at the succession of the candidate that can submit the exceptional succession plan within five years and undertake the plan actually within ten years.

(4) Nongovernmental Service: Escrow of document

Escrow is used to store document and disclose it when condition is fulfil. We can see software escrow contract in Japan.<sup>16</sup> A software licensee can access to the source code of software inn case of software licensor's bankruptcy by the contract. Source code is protected by the copyright and the trade secret of licensor.

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<sup>11</sup> [<https://faq.inpit.go.jp/tradesecret/service/>]

<sup>12</sup> INPIT introduces the cases using the time stamp service. It does not announce the number of cases officially. [[https://faq.inpit.go.jp/tradesecret/ts/ts\\_service.html](https://faq.inpit.go.jp/tradesecret/ts/ts_service.html)]

<sup>13</sup> Nonexclusive License Based on Prior Use, Patent Act 79 (Act No 121 of 1959)).

<sup>14</sup> [<http://www.moj.go.jp/MINJI/DENSHIKOSHO/>]

<sup>15</sup> See, [<http://www.chusho.meti.go.jp/zaimu/shoukei/2018/180405shoukeizeisei.htm>] (1) the number of stocks and the ratio of grace, (2) the candidate entrepreneur, (3) the relaxing hiring requirements, (4) new tax reduction.

<sup>16</sup> [<http://www.softic.or.jp/escrow/index.html>]

## 4 The support of the technology succession for engineer and crafts worker

### 4.1 Exclusive Method of Technology Succession

Predecessor mastered secret technique or arts teaches only to a child or a disciple, a secret method succeeded from parent to child. Manufacturing foodstuff, confectionery, craftwork and martial arts continues from generation to generation.

Predecessor takes over the secret recipe of ingredients and composition, uses technical terms understood by only high skilled crafts worker (a kind of encryption). The successor repeats work without verbal teaching by the predecessor (to memorize by body). Predecessor give all authorities of manufacturing to the successor who has most skillful technicians without any clear succession of information.

The merit of the exclusive approach are a longtime protection and a bar against competitor's business entry. Before the patent introduced, Predecessor exclusively succeeds technology.

The predecessor limits the successor to children, relative by blood or intimate pupils. The predecessor can avoid disclosure of secret technology after the succession by morality. It is effective to secure the technology succession.

The demerit of the exclusive approach is the risk of losing technology by nonexistence of successors. The succession depends on the skill to teach and training of predecessor. If predecessor cannot teach on technology well, it must disappear. Predecessor need to bear the cost including time spent to the education adding to the cost of the production. It is hard for individual and small entrepreneurs to bear these cost.

### 4.2 Award Program of the Government

(1) The award program of the outstanding skills workers (master craftsmen) by the Minister of Health, Labour and Welfare

By the award, the government hope to improve craftsman's status and standard of skills. It also encourage young workers to brush up skills and to devote to work.<sup>17</sup>

Candidates have outstanding technique, devote to work, and become a model of other engineers. The governors of prefectures the association of nationwide scale entrepreneurs can nominate candidates. The Minister finally decides the award consulting to the craftsman selection committee.

About 150 persons awarded each year. They receive certification, excellence skill chapter and 100,000 yen. The first award held in 1967. For 47 years, the number of

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<sup>17</sup> [<https://www.mhlw.go.jp/topics/bukyoku/syokunou/meikou/1.html>] (last access 20180711)

awarded person is sum up to 5,588.

(2) Other support by administrative agency

"Monozukuri Meister" (Production Master) is the program of human resource development for young craftsmen. To attract students manufacturing, providing practical guidance, encouraging them to work and encouraging to take skill level examinations.<sup>18</sup>

(3) Technical Intern Training Program (TITP)

It is the training program for foreigners. The purpose of the program is the transfer of skill developed technology, or a knowledge, etc., in Japan to the developing countries.<sup>19</sup>

About this training program, some abusive cases that trainee urged to work simple labor reported. It is important to ensure proper management of training according to the purpose of this program.<sup>20</sup>

#### 4.3 Protection of Intangible Cultural Asset (Living National Treasure)

The legal protection of traditional handicrafts and work is different from the one of an economic policy and protection of intellectual property rights.

The Act on Protection Cultural Properties protect them. The act protects tangible cultural properties, intangible cultural assets, folk culture goods, buried cultural properties and important cultural picturesque sceneries. The act also provides the support protection of the technology to reserve cultural properties.<sup>21</sup>

Cultural Affairs Agency provides the aid to the person (Living National Treasure) who holds of an important Intangible Cultural Property for improve the skill of technique and the role as a predecessor. The agency provides the subvention for the training

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<sup>18</sup> "Hitachi also a skill laboratory-training injustice?", Asahi Newspaper, 23 August, 2018.

[[https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/koyou\\_roudou/jinzaikaihatsu/monozukuri\\_master/index.html](https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/koyou_roudou/jinzaikaihatsu/monozukuri_master/index.html)]

<sup>19</sup> See, The law of the proper implementation of foreigner's skill training and protecting them (Law 2016 No. 89).

[[https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/koyou\\_roudou/jinzaikaihatsu/global\\_cooperation/index.html](https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/koyou_roudou/jinzaikaihatsu/global_cooperation/index.html)]

<sup>20</sup> See, "Hitachi also a skill laboratory-training injustice?", Asahi News Paper, August 23, 2018.

<sup>21</sup> See, The Act on Protection Cultural Properties (No official translation published), Article 147, The selection of the selected traditional reservation technique.

program of the succession to the association the Living National Treasure belongs.<sup>22</sup>

Director-General of the Agency for Cultural Affairs can advise disclosure records of the important intangible cultural heritage. Therefore the technical information recorded may be disclosed. <sup>23</sup>

Intangible cultural heritage has the skill of historical and artistic values, as a drama, music, and industrial arts. It is the human skill itself. The reason to support the person is intangible cultural asset embodied by the group or the individual that masters the skill.

The government select the important intangible cultural heritage and certifies the holder. The Living National Treasure receives special grant (2 million yen each year). The government also provides the subvention for training program of technology or skill succession and archiving program by the association certified by local government.<sup>24</sup>

For intangible cultural heritage not designated as important, the government select important skills as the intangible cultural asset that should be recorded. The government makes record of the skill and provides subvention to the local government to record or publish the important skill. <sup>25</sup>

#### 4.4 Support by local government

##### (1) Tokyo Metropolitan's Example

There are supports by the local government, for example Tokyo Metropolitan government.<sup>26</sup> It provide the subvention for the undertaking to succeed manufacturing technology and technique. Based on the subvention, the Central Association of Tokyo Metropolitan Small and Medium Enterprises Association provides support of improving productivity to group of producers. It supports the undertaking of improving productivity and taking over technology and techniques by associations of small entrepreneurs. This program contributes to survive and develop the industry in Tokyo. <sup>27</sup>

## 5 Protection as Trade Secret

### (1) Japanese Law and Case

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<sup>22</sup> [<http://www.bunka.go.jp/seisaku/bunkazai/shokai/mukei/>]

<sup>23</sup> See, The Act on Protection Cultural Properties Article 71.

<sup>24</sup> Besides this, the government supports training of successor in the National Theater, in Noh play, Bunraku puppet play, Kabuki, etc.

<sup>25</sup> See, The Act on Protection Cultural Properties Article 77.

<sup>26</sup> [<http://www.sangyo-rodo.metro.tokyo.jp/jouhoukoukai/shishutsu/shoko-h28-14.pdf>]

<sup>27</sup> [<https://www.tokyochuokai.or.jp/sienseido/jyoseijigyuu/gijutugino.html>]

Technology and technique are trade secrets protected by the Unfair Competition Prevention Act in Japan.

Article 2(4) of the Act

'[T]he act of acquiring by theft, fraud, duress, or other wrongful means (hereinafter referred to as an Act of Wrongful Acquisition), or the act of using or disclosing (including disclosing in confidence to a specific person or persons; the same applies hereinafter) Trade Secrets through an Act of Wrongful Acquisition'.

The requirements of trade secret protection are confidentiality, utility and un-well-known.<sup>28</sup>

In Japan, the one court case admitted to protect a traditional technology as a trade secret.<sup>29</sup>

The technology succession with business succession fulfill the un-well-known requirement of trade secret. However once the technology succession to the third person openly, it is never trade secret under the present Act.

Therefore, it is hard to harmonize technology succession and trade secret protection.

It is arguable whether the technology mastered by the craftsmen is a trade secret protected by the Unfair Competition Prevention Act.

Some commentators distinguishes general technology and special one. The special technology is a trade secret.

The general technology lose its secrecy because everyone can access the technological information. The general technology is not a trade secret.<sup>30</sup>

The technology developed during work is a trade secret based on a worker's obligation of confidentiality.<sup>31</sup>

Trade secret differs from know-how. Know-how is an object of technical confidence.

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<sup>28</sup> Eiji Tomioka, *Protection of Trade Secret*, Makino and Iimura ed. CHITEKIZAISAN-SOSHO (Intellectual Property Litigation), SHIN-SAIBAN-JITSUMU-TAIKEI (4), SEIRINSHOIN 2001, at 472.

<sup>29</sup> Sendai District Court Judgment, January 31, 2008 Hanrei-Times No. 1299 at 283. Defendant illicitly receive the trade secret by making Tsusumi-Ningyo, cray dolls using a mold without promotion of copying. The court ordered the injunction of produce goods using the mold, their distribution and display and destruction of goods made using the mold.

<sup>30</sup> Naruki Chaen, Fusei-Kyoso-Boshi-Hou (Unfair Completion Prevention Act), Yuhikaku 2016, at 67.

<sup>31</sup> See, Chaen 2016, at 79.

The knowledge and experience that craftsmen masters are general and special knowledge. The law only protects a special knowledge as a trade secret. <sup>32</sup>

The court judgement exists.<sup>33</sup>

'The general knowledge and skill that craftsmen mastered while employment constitutes the craftsmen's personal property. It is against the public order and good customs that the employer prohibit the craftsmen to master skills. Because it leads to restrict unfairly the craftsmen's freedom to choose one's occupation.

However the special knowledge that the craftsmen only mastered is a property that should be protected as a trade secret.'

## (2) Previous Amendment of Law

In the Japan, the Unfair Competition Prevention Act amended about trade secret protection.

The amendment of the Act in 2018 ease the un-well-known requirement. It will promote big data utilization. New provisions are not effective yet. The technology information of skilled craftsmen recorded by IoT is the important big data. Therefore, we can harmonize technology succession and trade secret protection referring the amended provisions.

## 6. Case of Technology Succession

We can see how the technology taken over the specific technology in close and in open ways. An example is the technique of hand scraping of metal surface ('Kisage' in Japanese) is essential technique of finishing metal surface. It reduces friction between parts of sliding parts or rolling parts. It is traditional but essential for manufacturing precision machine, especially a machining center. Machining center is a computer controlled automated machine.

This technique by hands cannot replace by machinery procedure. Special technique is taken over from a master to young workers.

About this technique, some company take open training program. <sup>34</sup> Another company upload tutorial of hand scraping technique on SNS. <sup>35</sup>

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<sup>32</sup> Shoen Ono & Nobuo Matsumura, Shin-Fusei-Kyosou-Boushi-Hou-Gaisetsu (Dai2Han), Seirin-Shoin 2015, at 340.

<sup>33</sup> Nara District Court Judgement, October 23, 1970, Kakyu-Saibansho-Hanrei-Shu-Minji-Hen, Vol. 21 No. 9=10, at 1369.

<sup>34</sup> [ <http://www.m-e-c-pro.com/creation.php> ]

<sup>35</sup> [ <https://kitamura-machinery.co.jp/mc/kisage/> ] Video introduces hand scraping is shown in the URL. [ <https://www.youtube.com/embed/ZTru-KEdaR8> ]

Some company introduce IoT in recording hand scraping collected data help young workers to master this technique. <sup>36</sup>

## 7. Conclusion

As increase of the aged, technical succession becomes an urgent problem.

Increase of the aged occurs in many countries other than Japan.

The effective method of technology succession is to digitize the production process.

In foreign countries, digitization of the production is proceed supported by the governments.

Germany government proposed the project of the "Industrie 4.0" in 2011.

The project aim is to minimize the cost of production. Smart factories introduce digitization, automation and virtual technology into the production. <sup>37</sup>

The Japanese government published the 5th term Science and Technology Basic Plan by the Cabinet decision on 22 January, 2016. <sup>38</sup> It propose the Society 5.0 that advances the introduction of smart technology in the society. <sup>39</sup>

As described above, another method of technology succession is to support skilled craftsmen individually. The systems of supporting them has inevitable limitation. The range of people who can inherit technology is restricted because the succession is from person to person.

About the recorded intangible cultural asset, it may be possible to take over technology to a third person by disclosing the record. The range of people who can inherit technology is also restricted.

We need to compare the digitalization of skilled technology and the inheritance by individuals. The digitizing skilled technology contribute to the technology succession. Because it is easy to replay or apply the digitalized technology in production process.

However, the legal protection of digital data including skillful technology as trade secret become strengthen. It permits the exclusive right to use technology by the data holder. It is different to the method disclosing technology to the third persons.

In technology succession, to support skilled craftsmen does not harmonize with to

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<sup>36</sup> [ <https://www.titech.ac.jp/english/news/2018/041927.html> ] This company has inside training program of metal finishing technique. It take about ten years for young craftsmen to master special techniques. The capacity of training program is limited. To use IoT is necessary to broaden the capability of the training program.

<sup>37</sup> [ <https://www.bmbf.de/de/zukunftprojekt-industrie-4-0-848.html> ]

<sup>38</sup> [ <http://www8.cao.go.jp/cstp/kihonkeikaku/index5.html> ]

<sup>39</sup> [ [http://www8.cao.go.jp/cstp/society5\\_0/index.html](http://www8.cao.go.jp/cstp/society5_0/index.html) ]

Paper presented at the RCSL-SDJ Conference 'Law and Citizenship Beyond the States',  
Lisbon, 10-13 September 2018

strengthen trade secret protection. Because the latter mainly focus on economic efficiency.

It is necessary to examine the laws to harmonize method to support skilled craftsmen  
and economic efficiency for the entrepreneurs.