

論 説

The “Sixth Industrialization” for Japanese Agricultural Development

Ken NAKANO

Abstract

Japanese agricultural production has been decreased by the intensive international competition in the advance of globalization, and the activities of “sixth industrialization” which promote domestic agriculture have been increased. The previous studies pointed out (1)the mismatch among farmers, food processors, and consumers, (2)luck of knowledge of sixth industrialization, (3)irrationality of social division of labor. From this background, this paper tried to examine the validity of an education program to cultivate human resources as the actors of sixth industrialization to fix the problems which previous studies pointed out.

In this experimentation, the test subjects tried to run a real business by obtaining irregular pears, processing them into dried pear, and sold the dried pear by themselves to demonstrate the validity of this education program. From the result, it is possible to avoid the mismatch mentioned above, and the accumulated information throw this experimentation will help to organize the knowledge of sixth industrialization. However, considering the labor cost, the profit form this business was red, and from this result, this paper pointed out the problem of actual activity for sixth industrialization. On the other hand, this paper also pointed out that this education program has a certain level of career creation effect by the changes of test subjects throw the activity.

1. Introduction

Japan is one of the biggest food import countries, and when it takes part in TPP (Trans-Pacific Strategic Economic Partnership Agreement), Japanese consumers receive benefits of the imported foods in terms of variety and price. However, some of the import foods tend to cause problems such as food quality, and “green consumers” who care about human health and natural environment are gradually increase in number. From this background, the “Sixth Industrialization” activities have arisen to promote domestic agriculture.

The sixth industrialization means combination projects what agriculture, food processing,

and retail to create new products by using agricultural products to increase consumption of the agricultural products. In Japanese, primary industry is called industry No.1, secondary industry is called industry No.2, and tertiary industry is called industry No.3, and 6 is the number which multiplied these three numbers. That is why the combination projects are called sixth industrialization, and this paper will report the result of an empirical study of the education program to cultivate human resources as actors of the sixth industrialization.

2. Challenges of sixth industrialization

The definition of sixth industry is the projects and activities that creating job opportunities especially for elder people and women to increase agricultural income by combining secondary industry and tertiary industry with primary industry (Imamura 1998 p.1).

At first, the "sixth" means addition of three industries. However, if one of them is disappeared, the combination project is also disappeared. Because of this reason, the meaning of "sixth" was changed multiplication (The ministry of agriculture 2010).

The early sixth industrialization activities aimed at formation of a food system by diversification of the agriculture, forestry, and fisheries industry, but they changed to aim at creation of new businesses to combine the agriculture, forestry, and fisheries industry nowadays (Chitose 2011). Direct sales, direct delivery from the farm, a farmer's restaurant, and pick-your-own farm shop are the examples.

The advantage of the sixth industrialization is that the additional value which secondary and tertiary industries have acquired is allocated also to the primary industry. Moreover, new businesses are created by secondary and tertiary industry advancing to rural areas which is the production site of primary products as input materials for processing, and these businesses also promote rural economy.

However, in creation of new businesses, the "mismatch" between a farmers, food processors, and consumers cause problems. Saito (2007 pp.20-25) pointed out five factors of the mismatch. (1)conflict between downstream of the food system and consumers, (2)conflict between farmers and the middle and lower streams of the food system, (3)logistics innovation by the vertical integration of the food makers, (4)adjustment of domestic food system by imported foods, and (5)transition to the safer food system.

Hotta (2012 pp.14-15) also pointed out other factors of the mismatch. (1)Farmers want to sell irregular products as processing input goods, but (2)food processors want to buy standard inputs for stable production. Moreover, (3)consumers tend to avoid buying expensive food products, even if they are strongly interested in food safety and quality. For promoting sixth industrialization, to overcome such mismatch is needed.

On the other hand, there is a problem which is hard to avoid also about local formation of production sites indispensable to the sixth industrialization. The Japanese Agricultural Cooperatives (JA) mainly organizes committees for every agricultural product to support to create local production sites and keep their productions. However, Hotta (2012 pp.40-42) has pointed out that accumulation of the knowledge for the sixth industrialization and compile the knowledge in a manual is not progressing at many production sites. This problem is also a challenging issue for sixth industrialization promotion.

On the other hand, Hidaka (2011 pp.20-21) pointed out that the sixth industrialization of agriculture by a farm contradicts the rationality of social division of labor. That is, if a farm integrates the functions of other industries by the sixth industrialization, the risks and costs which other industries have are also integrated to the farm, but there is not a clear explanation for this problem.

In addition to these previous studies, Nakano (2014) bring out the difficulty that a farm integrated the functions, risks, and costs of other industries because the farmer's profession is agriculture, and do not have the knowledge of food processing and retailing. To challenge this problem, cultivate human resource as the actors to realizing sixth industrialization as substitute for farmers is needed. This will enable farmers not only to concentrate agriculture as specialists, but also to provide extra agricultural products as input materials to the actors of sixth industrialization, therefore their farm operation can be stable and agricultural income will be able to increase.

The purpose of this paper is to try to examine the validity of an education program which build based on this hypothesis to cultivate human resources as actors of sixth industrialization for the problems that need to be solved which previous studies pointed out such as (1)the mismatch between farmers and food processors, (2)accumulation of the knowledge for the sixth industrialization and compile the knowledge in a manual, (3)contradicts the rationality of social division of labor.

3. Dissolution the mismatch between farmers and food processors

In the sixth industrialization, it can be said that use of "irregular agricultural products" as the input materials is a key factor to success. In agricultural products, there are two types of products, one is "standardized products" for sale, and the other is "irregular products" not for sale. Although the irregular products are the same as standardized products in terms of food safety and the nature of food (taste, smell, texture, and so on), same of them might be sold as processing materials, but most of them are discard because of the color or the size.

The farmers want to sell the irregular products at reasonable price, but food processors

want to buy regular products which suitable for mass machine processing. Since this mismatch, farmers have to process the irregular products by themselves if they want to reuse the irregulars. However, the irregulars come out during the on season which is busiest period for harvesting and shipping, thus farmers cannot afford to process the irregulars and discard them unwillingly.

Such the irregular products impose not only production cost, but also disposal cost on the farmers. Moreover, in order to make waste what is not used and to arises meaningless cost (soil improvement, drainage treatment, and so on), unnecessary environmental load is generated. If it can be possible that reduce the waste and make a profit by reuse the irregular products, farmers can reduce disposal cost and earn extra money at the same time.

On the other hand, the sixth industrialization actors can get an advantage what reducing input material cost using the irregular products to create new products by collaborating with the farmers. This advantage will support the business operation which tends to be unstable in the early stages of founding a company and sustainable development of the company. From this reason, when beginning the sixth industrialization, using irregular agricultural products for R & D and experimental commodity production is helpful for business creation.

It can be a solution of the mismatch between farmers and food processors if this hypothesis becomes true in this study.

4. Knowledge accumulation by an empirical study

In this study, I have built an education program to cultivate human resource as the actors for sixth industrialization and conducted this tentative program to accumulate the knowledge for business creation. This program is constituted by two different curriculums. The one is "lecture" for knowledge accumulation, and another one is "business practice" from the real experiences.

The lecture part in this program is especially focused on student's (the subjects') output by the process that trainer explain and demonstrate something, then make the students carry it out, and then, evaluate and make the students another try. By this process, students not only accumulate knowledge, but also can develop their skills based on the knowledge. However, it was difficult to conduct many classes because I have to build and operate whole education program independently at the beginning of this experimentation. Therefore, the subjects were recruited from the second and third graders in faculty of economics and business administration.

Moreover, since this program is in the experimental stage towards a regular subject, the students who are the subjects cannot receive any credits, and they also cannot receive any

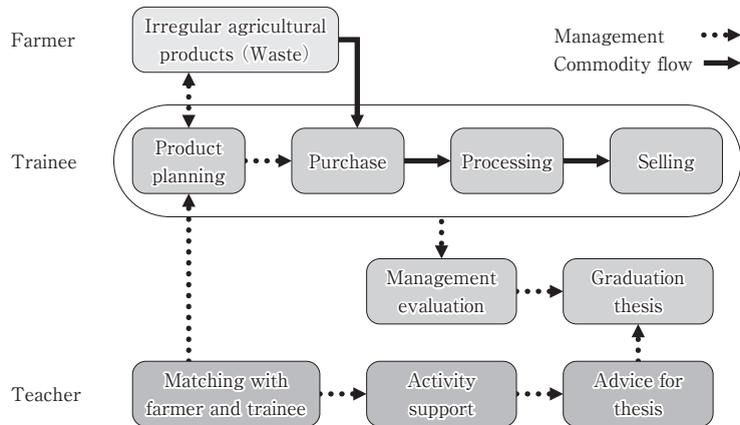
Table 4. 1. The lecture (plan)

No. 1	Guidance: explanation of the purpose of this experimentation
No. 2	Lecture: how to make a presentation
No. 3	Practice: making a presentation
No. 4	Lecture: how to write a short thesis
No. 5	Practice: presentation own short thesis
No. 6	Lecture: how to analyze previous studies (literature review)
No. 7	Practice: presentation own literature review
No. 8	Lecture: how to write a thesis
No. 9	Practice: presentation the structure of own thesis
No. 10	Lecture: how to do field work
No. 11	Practice: analyze secondary data
No. 12	Practice: midterm presentation (own thesis)
No. 13	Lecture: how to write an entry sheet
No. 14	Practice: presentation own entry sheet
No. 15	Practice: final presentation (own thesis)

rewards because there is no research expenditure for this experimentation. Therefore, the subjects can only receive “own growth” through the experiences in this education program. Since this condition, I set up the contents of the lecture to focus on career education to train the subjects to prepare for their job-hunting as their benefit. On the other hand, the purpose of the business practice demonstration is to accumulate the knowledge and know-how and to clear the validity for sixth industrialization. Thus, when the subjects yield a profit, the total profit will allocate all of the subjects after the demonstration to make them adopt a serious stance.

The table 4. 1 shows the contents of the lecture. The contents are focused on a method of making a presentation, writing a thesis, and writing an entry sheet for job-hunting. About the making a presentation, at first explain how to make a presentation, and then demonstrate it by myself. After that, do it by the trainees and evaluate them, then make the trainees retry until they can do it sufficiently. About the writing a thesis, explain how to write a short thesis as the first step, and then show the examples by my own writing. After that, write a short thesis by the trainees and evaluate them, then make the trainees revise it until sufficient level. When the trainees become to write sufficient level of a short thesis, teach how to write a thesis as the second step as the same way with the short thesis. Similarly about writing an entry sheet, explain and show the examples by myself, and then make trainees do and revise it until sufficient level. By this method, it aimed at that the subjects become to express their thinking, opinions, and suggestions actively in the business practice.

Figure 4. 1. The business practice



On the other hand, in business practice, the subjects receive irregular agricultural products, create a new product plan by using the irregular products, and try to realize the new product by themselves. However, planning a new product as a part of career education has been started same high schools' and universities' regular subjects, and some students' ideas from the lessons has realized as commercial products by some private companies.¹⁾ Nonetheless, these product planning trainings is only a part of entire production processes in the real business; therefore the students will experience a limited part of the business as a simulation. In contrast, this business practice differs from the existing educational programs in terms of that students (the subjects) try to create and conduct all production states such as marketing, planning, purchasing, processing, selling and promoting by themselves.

A teacher (the experimenter) finds the farmer which offers irregular agricultural products, and gives students (the subjects) the information as shown in Figure 4.1. The students form the product plan, negotiate with the farmer, and purchase the irregular products. The students also negotiate with the farmer to operate their business in this practice whenever it needed (input material price, selling price, transaction type (purchased selling or contract selling), and so on). In this way, after preparing the starting conditions for running the business, the students produce original products and sell and promote them as the business practice. The teacher teaches and trains the students by both the lecture and the business practice to promote their skills for running the business. Furthermore, the teacher gives the knowledge and methodologies of business analysis which is needed for the students to operate their business.²⁾ The students report the result of their business analysis in the end of the last semester, and the teacher teaches and helps them to rewrite the report as a thesis.

In this study, I built this tentative educational program and demonstrated it to accumulate the knowledge and know-how for the sixth industrialization.

5. Combine primary industry, secondary industry, and tertiary industry

Since there was no research expenditure for this research as at April, 2013, in order to start this experimentation, a farmer which offers an irregular agricultural product (primary industry), and a company or organization which lend processing equipment were needed (secondary industry). In September, agriculture, forestry and fisheries division of Kusatsu city hall introduced me “O farm” who wanted to make dry pear by irregular products. O farm was interested in my experimentation and offered irregular pear, also it has food dryer, and therefore we started producing dry pear as the business practice.³⁾

On the other hand, the subjects of this experimentation were targeted at the students of Ritsumeikan University’s Biwako-Kusatsu Campus (BKC) in which I worked at that time. I explained my experimentation and this situation to the professors and lectures work at BKC, and regulated students as the subjects in their classes. As a result, twelve students applied and the ten became the subjects, finally. In the ten subjects, the eight are from faculty of economics (six second year students and two third graders), the one is from faculty of business administration (a first grader), and the last one is from faculty of science and engineering (a first grader).⁴⁾

This experimentation would start at the beginning of the second semester, but it takes more time to recruit the subjects than expected and started one week after the original plan.⁵⁾ At first, the schedule of the lecture was set as first period on every Friday (from 9:00 to 10:30), and the workplace of business practice was set O farm’s, in by first-time guidance.

By this preparation, it was enabled to combine agriculture (primary industry) and food industry (secondary industry) which are indispensable to the business practice. On the other hand, it was presupposed that the remaining retail (tertiary industry) is practiced the subjects themselves, and the environment for starting the experimentation was ready.

6. Result of the experimentation

Table 6.1 shows the result of the lecture. The lecture was held on 15 times in the original plan, but my business trip and the business practice activities overlapped sometimes, thus it was reduced 13 times in fact.

I had a chance to report this research in a “rice bowl seminar” (an intramural workshop) in October 22, hence I decided to make the subjects a presentation about their actual experiences of this education program and promotion “dried pear” which is dried fruit

Table 6. 1. Result of the lecture

No. 1	Oct. 11, 2013	Guidance
No. 2	Oct. 18, 2013	Prepare for “rice bowl seminar”
—	Oct. 25, 2013	Canceled by experimenter’s business trip
No. 3	Oct. 27, 2013	Lecture: how to write a short thesis
No. 4	Oct. 29, 2013	Practice: presentation own short thesis
No. 5	Nov. 1, 2013	Lecture: how to write a thesis
No. 6	Nov. 8, 2013	Lecture: how to make a presentation
No. 7	Nov. 15, 2013	Discussion: about the business practice in this term
No. 8	Nov. 22, 2013	Practice: making a presentation
No. 9	Nov. 29, 2013	Lecture: how to write an entry sheet
—	Dec. 6, 2013	Canceled by the promotion activity on the radio
No. 10	Dec. 13, 2013	Discussion: about the business practice for next term Practice: making a presentation
No. 11	Dec. 20, 2013	Lecture: guest speaker Mr. Tsuda “which a parson is wanted by companies”
No. 12	Jan. 10, 2013	Practice: presentation own entry sheet
No. 13	Jan. 17, 2014	Look back the result

they made of pear together, and spent one lecture for the preparation on October 18.

Moreover, since the “seminar convention” (a research paper convention for the intramural students) was scheduled on December 14 and there was a strong request from the seven subjects for participating the convention by their research in this education program, I changed the original plan to teach how to write a short thesis and a thesis. However, since research findings needed to be summarized for a short period of time, I could not have enough time to teach the subjects only in the lecture on Friday, hence I set extra lectures on October 27 and 29, and then taught each student tutorially.

Furthermore, since the intramural “venture business contest” is scheduled on November 30 and the two subjects wanted to participate the contest by their original plan created in this education program, I set presentation lectures more than the original program to prepare for the seminar convention and the venture business contest.

On the other hand, through the activity in this business practice, new relations with some external organizations was created, and the activity which was assumed before starting this experimentation was changed by various additional activities with the organizations. Therefore the subjects had to operate some activities at the same time, and they confused and asked me about the purpose and priority of the business practice, thus I set the opportunities to discuss about the business practice for this term and next term experimentation on November 15 and December 13.

On the other hand, through this education program activities, the subjects organization

named “empirical-study circle” has been gradually known in campus, and been obtained support from some teachers and staffs, thus I set a special lecture for preparation of the subjects’ job-hunting by Mr. Masaya Tsuda, professor of Ritsumeikan University and former vice president and chief technical officer of SCREEN Holdings Co., Ltd. as a guest speaker on December 20.

In parallel with the lecture, business practice was started on October 12. At first, all the members visited to O farm to introduce each other, and checked the processing steps and the time. As the result, the subjects set the work procedure that cutting and drying the irregular pears is every Saturday and packing and pasteurization of the dried pear is every Wednesday, also set the person in charge for both the days.

Although the shipping period of ordinal pear is from the beginning of August to the end of October, but O farm plant four kinds of pears and adjust the pears bear a fruit one by one, thus processing training was completed on December 4.

On the other hand, sales preparation of the dried pear was completed on November 9, and the number of the products which is made by the subjects was 134 from this time. Although O farm was also making the dried pear from irregular pears during this period independently, to avoid mixing up its products and the subjects’ products, the drying process controlled individually. This aimed for that the subjects have a responsibility to produce and sale the products to consumer and conduct the business practice seriously.

Since O farm set up the expiration date in three months, the subject contracted with O farm to sell dried pears which were only they made from November 9 to February 9 (next year), and started sales training. Moreover, although O farm had set the product prices as 100 yen per 100 grams and one-bag is 300 yen in 300 gram, the questionnaire which taken by the subjects at first sales training on November 14, showed the price was too high. Therefore, the subjects repacked 100 gram per one-bag to change the price into 100 yen, and until the processing training was completed, they made 80 bags of 100 yen products.

Sales training is carried out 5 times, and the hall usage fee is as follows. It was no charge in front of the university co-op in BKC on November 14, the exhibition space of JA Ohmifuji’s farmer’s market on December 8 was 500 yen, Panasonic’s cafeteria on December 13 and 27 was 160 yen (5% of sales), and Ferie’s exhibition space in front of Minami-Kusatsu Station on February 4 was 3,100 yen, and the total cost was 3760 yen.

The amount of sales by 300 gram bag was 40,200 yen (300 yen×134 bags), by 100 gram bag was 5,900 yen (100 yen×59 bags: the lest of 21 bags were used for tasting), and the total price of sales was 46,100 yen.

7. Considerations

According to the O farm, the amount of kerosene which was needed for one drying of the pears was about 10-14 liters, thus the average was 12 liters. Since the price of 18 liters of kerosene was 1,825 yen on October 15, 2013, the price for 12 liters was 1,217 yen. The 300 gram product made 30-40 bags from one drying, hence the average was 35 bags, and the weight was 10,500 gram, therefore the fuel cost of 100 gram of dry pears was 11.6 yen. Moreover, a bag is 2 yen and a desiccant is 3 yen per piece, hence these costs per product are 5 yen. The cost of an irregular pear is abstracted because it is un-computable. From these figures, the cost of 300 gram product was 5333.2 yen ($134 \text{ bags} \times 11.6 \text{ yen} \times 3 \text{ times} + 134 \text{ bags} \times 5 \text{ yen}$) and the cost of 100 gram product was 979.4 yen ($59 \text{ bag} \times 11.6 \text{ yen} \times 1 \text{ time} + 59 \text{ bag} \times 5 \text{ yen}$), therefore the total material cost was (A) 6312.6 yen.

On the one hand, processing training was 11 times and the total was 166 hours. This working hours correspond with 121,180 yen if it is converted by the minimum wage of 730 yen of Shiga Prefecture (October, 2013). Moreover, in the total, the 33 subjects participated in processing training, and the transportation fees (900 yen for the round trip from the nearest station per parson⁶⁾) was 29,700 yen, therefore the total cost of processing training is (B) 150,880 yen.

On the other hand, the total of the working hours of five sales training was 39 hours. If this is converted as same as above, it will be 28,470 yen, and is the total hall usage fee of 3760 yen is added, it will be 32,260 yen. In the total, however, the 12 subjects participated in sales training, but there was no use of public transportations, hence the transportation fees did not occur. The petty charge (stationery, communication cost, printing cost, and so on) was 5,876 yen, therefore the total cost of sales training is (C) 38,136 yen.

From the above, the dried pears cost per 100 gram is 423.7 yen ($((A+B+C)/46,100 \text{ gram} \times 100 \text{ gram})$). Compare this cost and the sale price of 100 yen per 100 gram, it is clear that the cost is more than 4 times higher than sale price.

It is true that some experiments to make the dried pear more beauty and data collection for the sixth industrialization were prioritized than the productivity in this experimentation, but the result shows it is difficult to generate profits from the dried fruit production by using irregular pear.

8. Conclusions

This research focused on the problems which are sixth industrialization included as pre-

vious studies pointed out (1)the mismatch between farmers and food processors, (2)accumulation of the knowledge for the sixth industrialization and compiles the knowledge in a manual, and (3)contradicts the rationality of social division of labor, and try to derive a solution for these problems by experimentation. However, it is difficult for farmers to operate sixth industrialization because of these problems.

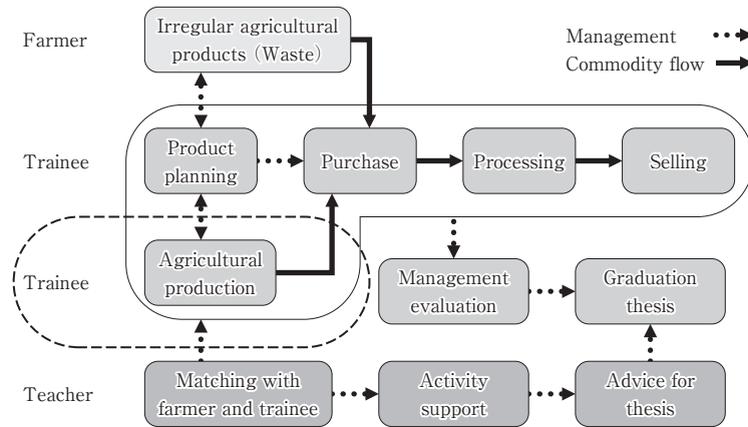
Therefore this research emphasizes the need of the actors who substitute farmers to create new business and operate it as sixth industrialization. Based on this hypothesis, I built a tentative education program to cultivate human resources as the actors of sixth industrialization and examined the validity of it to solve these problems. From the result of this experimentation, it can be said that this education program is useful for dissolution of the mismatch of the problem (1). Moreover, it can be said that the manuals of processing and sale created in this experimentation and this research paper can be help for the problem (2).

However, the consideration above shows, the result is not a solution for (3). In this experimentation, the business practice not link the lecture in terms of marketing also the production subject and the price has been given without any marketing strategies at beginning of the business practice by some limitations. However, to earn profits by sixth industrialization, the product planning must be based on market research rather than on a request from a farmer. From this result, I set the lecture for precise marketing and building marketing strategy at first, and then adopting this strategy into the business practice in next term experimentation.

On the one hand, the effect of the human resource cultivation of this educational program can be confirmed a certain level. Both of 2 teams (the seven subjects) which participated in the seminar convention won a prize. Moreover, the team (the two subjects) which participated in the venture business contest missed the award but passed the pre-judging. At this time, it has confirmed by the analysis that it was difficult to conduct stable management of sixth industrialization by a single irregular agricultural products. Hence, I appeared FM radio and city sales promotion by Kusatsu city hall to promote this education program with the subjects to create new linkage with other farmers, food pressers and retailers for next term experimentation. As a result, this education program gets some farmers which offer Japanese horseradish, rice and a chicken egg and two companies which offer agricultural and food possessing equipment.

On the other hand, transportation fees are big cost next to labor cost hence I installed the processing practical room in BKC so that all of the processing operation can be done in the campus. Moreover, since it is difficult to create new product only irregular agricultural products, I installed planter plantation in the campus to obtain raw materials and to understand the nature of agricultural products for the subjects' product R & D, thus the subjects can grow agricultural products which they need (figure 8. 1). The sale training

Figure 8. 1 Renewed business practice for next period



can be conducted by cooperation with the university co-op in the campus periodically, thus the environment to carry out the business practice in the campus was ready. This also became possible to commercialize at lower cost than before, and also to commercialize two or more product planning simultaneously from now on.

To keep carrying out the business practice, it would be possible that the subjects can create a hit product, and when the business operation sustained growth trajectory, it can be possible to contract a farmer for stable production and both the subjects and the farmer get more profits. In order to verify such a hypothesis, next term experimentation is adopted renewed business practice and combined it with renewed lecture for year-round experimentation. The purpose of next experimentation is to aim to develop this education program into a regular subject.

Notes

- 1) One of the examples of collaboration product by students (Tama Art University) and a private company (Nestle Japan) is a coffee maker "nescafe gold blend barista TAMA" reported by Nihon Keizai Shimbun (October 8, 2014). Another example by students (Tukuba University) and private company is roll of toilet papers reported by Nihon Keizai Shimbun (October 16, 2014). However, these students only planned both of the products, and the companies produce and sell the products by contract with the students, but in this business practice, studentw(s) will conduct from product planning to selling the products by themselves.
- 2) However, the business analysis which I planned in the original lecture was changed to career education in this experimentation, thus this subject was carried over to the next experimentation which is held on next period.
- 3) Therefore, "planning the product by student(s) themselves" which was planned in the original practice was carried over to the next experimentation.
- 4) Neither the first grader nor the faculty of science and engineering student assumed as the subject for this experimentation, but some of them applied because they took the teacher-training course a course which I have recruited. Therefore, I explained the purpose and conditions

of this experimentation to the students, but their replies were highly motivated, so I accept to join the experimentation.

- 5) I had to operate the both of the lecture and the business practice by myself at the beginning, therefore I thought that six to eight persons' group was the optimal, but although invited about 300 persons at eight classes, there were 12 applicants, and I applied all the members in case of dropout. Incidentally, among these, two persons thought that they were "club activities" and dropout immediately, and lest of the ten were not dropout but one of them stopped participating in the lecture and the business practice in about one month.
- 6) The round trip between Minami-Kusatsu and Kusatsu station costs 240 yen, and Kusatsu station and O farm also costs 660 yen.

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