A STUDY ON NEW CONSTRUCTION TECHNIQUES AND SKILLS TRAINING WITH FOCUS ON THE PLASTERING SUBCONTRACTOR IN JAPAN

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The purpose of this study was to establish the contents and methods of a vocational education program for modern, advanced-level plasterers. The interview survey confirmed that there is a serious shortage of vocational education resources available for advanced-level plasterers. The first questionnaire survey for seminar attendants during September 2005 and November 2007, conducted in ten regional blocks nationwide, clarified the basic attributes of plasterers. The results of analysis, by multivariate statistical method (Hayashi's Quantification III) and cluster analysis, allowed plasterers to be grouped into eight types, and clarified the characteristics of each plasterer type as well as their relationships with each other when separated into the 10 regional blocks. In the follow-up survey in August 2008, a questionnaire completed by plastering site supervisors was analyzed. This analysis facilitated a thorough understanding of the current work responsibilities of plastering site supervisors, and the types of vocational education that will be needed by advanced-level plasterers in the future. Regarding the training methods necessary for the vocational education of advanced-level plasterers, training types were broadly divided into on-the-job training and off-the-job training, and then further sub-classified into 15 training types. Detailed vocational education contents were proposed for each sub-classification. Vocational education for plastering site supervisors trained through off-the-job training was implemented through a collaboration of the Japan Plasterers' Association and a university architecture department. The contents were described using a relational diagram. The results of the study were divided into the eight national types of plasterer mentioned above in order to facilitate vocational education for plastering site supervisors and advanced-level plasterers in accordance with the construction industry policy outline. In addition, the research results were used to establish and propose vocational education contents and methods based on the type of training required for each plasterer type.

Keywords: plastering site supervisor, architectural skills education, management education, Hayashi's Quantification Ⅲ, multivariate analysis, cluster analysis

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INTRODUCTION

In the Heian Era (794-1192 AD) of JAPAN, when wood and earth were the primary materials used to construct buildings and plasterers, together with carpenters, assumed the leading roles during building construction. Conventional technical education has been implemented within an apprenticeship system; however, the framework to support this system is now collapsing. However, in Japan, the training of technicians has been left to subcontractors; this has resulted in a lack of consistency, and this approach is now in a state of neglect. The modern building industry is characterized by major advances in construction technology and the challenge of new building technologies. In view of this, there is a need to train top-class plasterers who are capable of adapting to a constantly changing work environment. The work description of an advanced-level plasterer is to perform plastering work requiring advanced skills (that is, work that only a skilled craftsman or supervisor can handle), to work with clients and engineers to propose technical solutions and coordinate work processes, and to train, instruct, and guide young and subordinate workers. In order to perform these activities, advanced-level plasterers must have the management skills to provide appropriate and timely instruction, guidance, and proposals on-site. Advanced-level technicians who are skilled craftsmen, or who are supervisors and also have management skills, have come to be regarded as “supervisors” for the construction industry. Consequently, the Ministry of Land, Infrastructure and Transport has officially recognized advanced-level supervisors who pass a test implemented by a specialist construction industry body as “supervisors.”

Details concerning work-site vocational education at various plastering sites throughout Japan are unknown because this education has been implemented independently in each regional block. So far, regional differences in plastering skills and plastering education have not been analyzed.

This study is to present a classification of the plasterers being surveyed as the foundation of various discussions about technical education for plasterers and also to explain the types of senior plasterers in each region in order to show regional differences. The purpose of this study was to establish the contents and methods of a vocational education program for modern, advanced-level plasterers.

OUTLINE OF QUESTIONNAIRE SURVEY

The Japan Plasterers' Association conducted a questionnaire survey of all 618 trainees who attended the 1st through 10th training courses certifying Plastering site supervisor in 10 blocks throughout the nation (hereinafter, training courses) held from September 2005 to November 2007. The survey was titled "Questionnaire Concerning the Work of Plastering site supervisor on Construction Sites". As Table 1 shows, the questionnaire survey in each regional block was conducted on the last day of the training course. The questionnaire recovery rate was 100%. The Japan Plasterers' Association planned the questionnaire survey and requested Mihara Laboratory, MONOTSUKURI UNIV. Institute of Technology, to cooperate in the survey. Mihara Laboratory prepared the questionnaire and also collected and analyzed the data.

Training	Term	Trainees	Average Age (Years)	Place
1st: Kanto Block	2005: Sep. 20 (Tue) - 22 (Thu)	91	42	Shizuoka: Fuji Education Training Center
2nd: Tohoku Block	2006: Aug. 10 (Thu) - 12 (Sat)	41	42	Miyagi: SME University
3rd: Kinki Block	2006: Sep. 16 (Sat) - 18 (Mon: Holiday)	80	41	Osaka: Cosmo Square Hotel and Congress
4th: Hokkaido Block	2007: Mar. 5 (Mon) - 7 (Wed)	64	44	Hokkaido: JR Training Center
5th: Koshin-etsu Block	2007: Apr. 13 (Fri) - 15 (Sun)	59	42.7	Nagano: Village Azumino
6th: Hokuriku Block	2007: Apr. 20 (Fri) - 22 (Sun)	55	41.6	Ishikawa: Saigawaso
7th: Shikoku Block	2007: Jun. 22 (Fri) - 24 (Sun)	38	47.1	Kochi: Kochi Sunrise Hotel
8th: Chugoku Block	2007: Jul. 14 (Sat) - 16 (Mon)	53	43	Hiroshima: Hiroshima Seishonen Bunka Center
9th: Tokai Block	2007: Oct. 28 (Sun) - 30 (Tue)	53	41.2	Aichi: Sanparea Seto
10th: Kyushu Block	2007: Nov. 27 (Tue) - 29 (Thu)	84	44	Fukuoka: Qkamura, Shigamura
Total		618	42.9	

Table 1. Outline of questionnaire survey.

METHODS

Questionnaire data on the basic attributes of senior plasterers was compiled. Using multivariate analysis, plasterers from all the regional blocks were classified and the types of senior plasterers were presented. Then the regional differences of senior and general plasterers were analyzed. More specifically, the survey participants were classified by several attributes and the grouping of the senior plasterers in Japan was analyzed by performing a factor analysis using Hayashi's Quantification Method Type III. A cluster analysis was performed on the basis of the factor scores obtained using Hayashi's Method Type Quantification III. The purpose of the cluster analysis was to identify multiple similar factors and classify senior plasterers into clusters corresponding to a plasterer type. To show the regional differences of plasterers in Japan, the distribution of senior plasterers across clusters were compared between the 10 regional blocks.

RESULTS

Results of Questionnaire Survey

To confirm the basic attributes of senior plasterers with the questionnaire results, basic information was compiled from seven questions: (1) Age, (2) Experience as a plasterer (years), (3) Experience as a plastering site supervisor (years), (4) Employment position, (5) National qualification, (6) Doubling as a chief engineer, and (7) Position within the model work system. A total of 618 plasterers participated in the survey. Four participants returned invalid responses, resulting in a total of 614 valid responses being available for analysis. A significant difference test was performed on the results of the questionnaire survey The incidence rate was assumed to be 50%, the range of difference to be 5%, and the confidence level to be 95%. When these values were used in Formula 1, the result was greater than or equal to 384 participants. There were 618 participants in the survey. Because this was enough to identify statistically significant differences, we concluded that analysis was possible.

Formula 1:

$$n \geqq \left(\frac{Z_{\alpha/2}}{x}\right)^2 \pi(1-\pi)$$

n = (1.96/0.05) × 2 × 0.5 × 0.5 ≈ 384 (α = 0.05, $Z_{\alpha/2} = Z_{0.025} \approx 1.96$),

Table 2. Selected questions and response numbers by category.

Question	Category	No. of Replies
① Age	29 years-old or younger	28
	30 to 49 years-old	394
	50 years-old or older	192
② Experience as a plasterer	Less than 10 years	56
	11 to 20 years	244
	21 to 30 years	137
	40 years or more	177
③ Experience as a plastering site supervisor	None	35
	9 years or less	368
	10 to 19 years	140
	20 years or more	70
④ Employment position	Company employee	330
	Regular employee	65
	Daily or temporary employee	19
	Business owner	182
⑤ National qualification	First-class or second-class plasterer	583
	First-class or second-class construction management engineer	114
	First-class, second-class, or wooden building architect	30
	Vocational trainer (plastering)	265
⑥ Doubling as a chief engineer	Doubling as chief engineer	373
⑦ Position within the model work system	Full-fledged (skilled worker or work chief)	127
	Experienced plasterer (supervisor or senior supervisor)	327
	Subcontractor management engineer (construction leader)	67
	Vocational trainer or part-time college lecturer	40
	Advanced-level plasterer (master or expert)	14

Factor Analysis using Hayashi's Quantification Method Type III

A factor analysis was performed based on the questionnaire responses as described below. As shown in Figure 1, Factor 1 scores were larger for categories indicating more experience (e.g., "Experience as a plastering site supervisor: 20 years or more", "Experience as a plasterer: 31 years or more", and "Age: 50 years-old or older"). Factor 1 was designated the "Empirical factor" because it depended on the degree of experience as a plasterer. As shown in Figure 2, Factor 2 scores were larger for occupations in which plastering skills could be used (e.g., "Daily or temporary employee", "Full-fledged", and "Advanced-level plasterer"). The scores were smaller for those in organizational and managerial occupations (e.g., "Subcontractor management engineer" and "Business owner"). Therefore, Factor 2 was designated the "On-site occupation work factor". As shown in Figure 3, the Factor 3 scores were larger for those with higher levels of technical certification (e.g., "Vocational trainer or part-time college lecturer", "First-class, second-class, or wooden building architect", and "Advanced-level plasterer"). Therefore, Factor 3 was designated "Expertise factor". As shown in Figure 4, the Factor 4 scores were larger for those

with lower levels of field experience (e.g., "Experience as a plasterer: Up to 10 years", "Age: 29 years-old younger", and "Vocational trainer or part-time college lecturer") or more experience away from construction sites. The scores were smaller for those with more field experience, excluding on-site management (e.g., "Advanced-level plasterer", "Daily or temporary employee", and "Experience as a plastering site supervisor: None"). Therefore, Factor 4 was designated the "Field experience factor" .As shown in Figure 5, the Factor 5 scores were larger for those with higher levels independence as business owners or master plasterers (e.g., "Advanced-level plasterer," "Experience as a plastering site supervisor: None", "Daily or temporary employee", "Vocational trainer or part-time lecturer", and "Business owner"). Therefore, Factor 5 was designated the "Independence factor".

	Category	Factor 1
11	Experience as a plastering site supervisor: 20 years or more	2.6407
7	Experience as a plasterer: 31 years or more	2.1272
3	Age: 50s or older	2.0672
10	Experience as a plastering site supervisor: 10 to 19 years	1.1292
15	Business owner	0.9709
24	Vocational trainer or part-time college lecturer	0.9007
14	Daily or temporary employee	0.8054
25	Advanced-level plasterer (master or expert)	0.7511
8	Experience as a plastering site supervisor: None	0.6235
19	Vocational trainer (plastering)	0.5736
17	First-class or second-class construction management engineer	0.1005
22	Experienced plasterer (supervisor or senior supervisor)	0.0833
23	Subcontractor management engineer (construction leader)	0.0764
13	Regular employee	0.0638
6	Experience as a plasterer: 21 to 30 years	0.0572
20	Doubling as a chief engineer	0.0378
16	First-class or second-class plasterer	−0.0079
18	First-class, second-class, or wooden building architect	−0.5763
12	Company employee	−0.6866
2	Age: 30s or 40s	−0.9013
21	Full-fledged (skilled worker or work chief)	−0.9895
9	Experience as a plastering site supervisor: Less than 10 years	−1.0584
5	Experience as a plasterer: 11 to 20 years	−1.3133
4	Experience as a plasterer: 10 years or less	−1.6215
1	Age: 29 years-old or younger	−2.4538

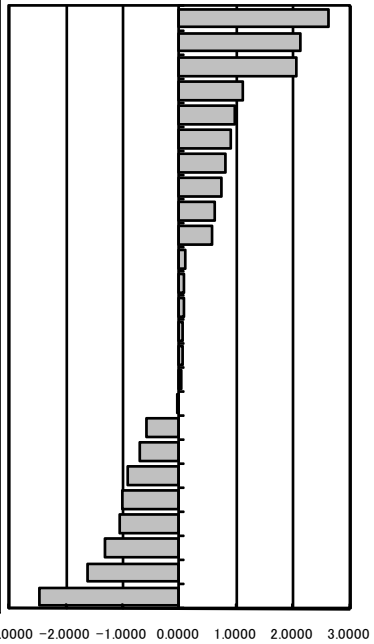


Figure 1. Factor 1 scores: Empirical factor.

	Category	Factor 2
1	Age: 29 years-old or younger	5.4855
4	Experience as a plasterer: 10 years or less	2.4984
14	Daily or temporary employee	2.4745
21	Full-fledged (skilled worker or work chief)	1.8220
25	Advanced-level plasterer (master or expert)	1.6260
11	Experience as a plastering site supervisor: 20 years or more	1.4235
7	Experience as a plasterer: 31 years or more	1.2347
3	Age: 50 years-old or older	0.9745
13	Regular employee	0.6702
8	Experience as a plastering site supervisor: None	0.5120
12	Company employee	0.4578
9	Experience as a plastering site supervisor: 10 years or less	0.2127
16	First-class or second-class plasterer	0.1515
5	Experience as a plasterer: 11 to 20 years	−0.0144
22	Experienced plasterer (supervisor or senior supervisor)	−0.1296
19	Vocational trainer (plastering)	−0.1753
20	Doubling as a chief engineer	−0.2095
2	Age: 30 to 49 years-old	−0.7300
15	Business owner	−1.0141
10	Experience as a plastering site supervisor: 10 to 19 years	−1.0300
24	Vocational trainer or part-time college lecturer	−1.1014
17	First-class or second-class construction management engineer	−1.3657
18	First-class, second-class, or wooden building architect	−1.7732
23	Subcontractor management engineer (construction leader)	−2.0522
6	Experience as a plasterer: 21 to 30 years	−2.2032

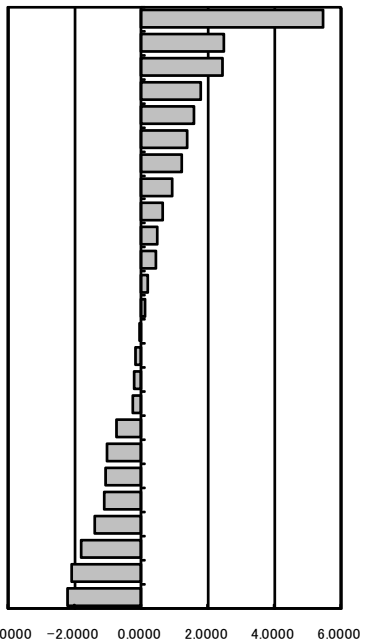


Figure 2. Factor 2 scores: On-site work factor.

	Category	Factor 3
24	Vocational trainer or part-time college lecturer	2.7208
18	First-class, second-class, or wooden building architect	2.2557
8	Experience as a plastering site supervisor: None	2.0332
11	Experience as a plastering site supervisor: 20 years or more	1.9019
25	Advanced-level plasterer (master or expert)	1.5780
23	Subcontractor management engineer (construction leader)	1.5208
15	Business owner	1.2221
17	First-class or second-class construction management engineer	0.8536
5	Experience as a plasterer: 11 to 20 years	0.7578
19	Vocational trainer (plastering)	0.4909
12	Company employee	0.2317
9	Experience as a plastering site supervisor: Less than 10 years	0.1816
21	Full-fledged (skilled worker or work chief)	0.1656
7	Experience as a plasterer: 31 years or more	0.0880
3	Age: 50s or older	−0.0329
20	Doubling as a chief engineer	−0.0391
2	Age: 31 to 49 years-old	−0.0522
4	Experience as a plasterer: 10 years or less	−0.0844
16	First-class or second-class plasterer	−0.1245
1	Age: 29 years-old or younger	−0.2644
22	Experienced plasterer (supervisor or senior supervisor)	−0.9745
6	Experience as a plasterer: 21 to 30 years	−1.6792
10	Experience as plastering site supervisor: 10 to 19 years	−2.1892
14	Daily or temporary employee	−3.5444
13	Regular employee	−4.1644

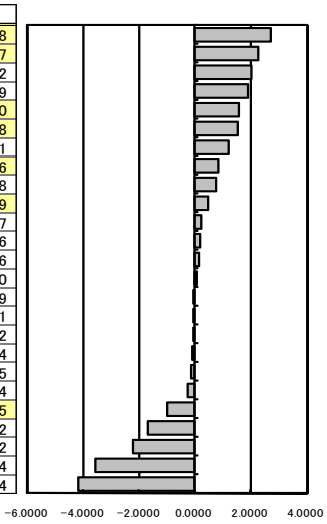


Figure 3. Factor 3 scores: Expertise factor.

	Category	Factor 4
4	Experience as a plasterer: 10 years or less	4.0921
1	Age: 29 years-old or younger	3.5532
24	Vocational trainer or part-time college lecturer	2.2022
13	Regular employee	1.7138
17	First-class or second-class construction management engineer	1.5958
21	Full-fledged (skilled worker or work chief)	1.1802
6	Experience as a plasterer: 21 to 30 years	1.0167
23	Subcontractor management engineer (construction leader)	0.9818
15	Business owner	0.8247
10	Experience as a plastering site supervisor: 10 to 19 years	0.4804
18	First-class, second-class, or wooden building architect	0.2581
19	Vocational trainer (plastering)	0.2243
11	Experience as a plastering site supervisor: 20 years or more	0.2024
3	Age: 50 years-old or older	−0.0709
20	Doubling as a chief engineer	−0.1101
9	Experience as a plastering site supervisor: Less than 10 years	−0.1188
16	First-class or second-class plasterer	−0.1299
2	Age: 31 to 49 years-old	−0.2885
7	Experience as a plasterer: 31 years or more	−0.3374
12	Company employee	−0.5255
22	Experienced plasterer (supervisor or senior supervisor)	−0.8325
5	Experience as a plasterer: 11 to 20 years	−1.3791
8	Experience as a plastering site supervisor: None	−1.8333
25	Advanced-level plasterer (master or expert)	−4.6804
14	Daily or temporary employee	−5.4942

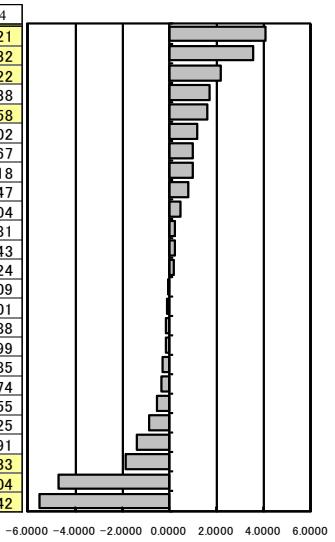


Figure 4. Factor 4 scores: Field experience factor.

	Category	Factor 5
25	Advanced-level plasterer (master or expert)	6.8206
8	Experience as a plastering site supervisor: None	5.6087
14	Daily or temporary employee	4.2683
24	Vocational trainer or part-time college lecturer	2.5092
4	Experience as plasterer: 10 years or less	2.1254
1	Age: 29 years-old or younger	1.2466
6	Experience as a plasterer: 21 to 30 years	1.2396
15	Business owner	0.9709
19	Vocational trainer (plastering)	0.7962
10	Experience as a plastering site supervisor: 10 to 19 years	0.1606
2	Age: 31 49 years old	0.1461
16	First-class or second-class plasterer	0.0421
22	Experienced plasterer (supervisor or senior supervisor)	−0.1332
21	Full-fledged (skilled worker or work chief)	−0.1644
9	Experience as plastering site supervisor: Less than 10 years	−0.2443
20	Doubling as a chief engineer	−0.2618
17	First-class or second-class construction management engineer	−0.4892
3	Age: 50 years-old or older	−0.5400
12	Company employee	−0.6199
7	Experience as a plasterer: 31 years or more	−0.6600
18	First-class, second-class, or wooden building architect	−0.7486
5	Experience as a plasterer: 11 to 20 years	−0.7510
13	Regular employee	−0.9628
11	Experience as a plastering site supervisor: 20 years or more	−1.9772
23	Subcontractor management engineer (construction leader)	−2.2355

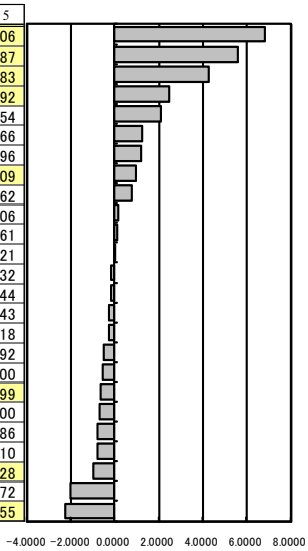


Figure 5. Factor 5 scores: Independence factor.

CLUSTER ANALYSIS

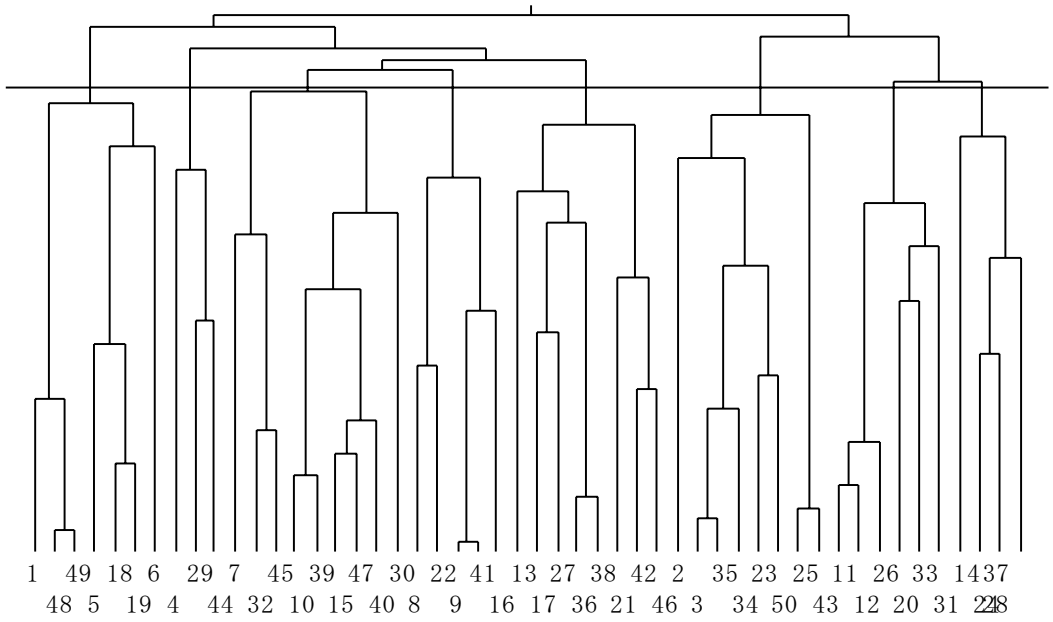


Figure 6. Dendrogram illustrating the results of the cluster analysis

The category scores obtained using Hayashi's Quantification Method Type III to generate factors from the 614 participants returning valid responses were entered into statistical analysis software and analyzed using non-hierarchical cluster analysis (the k-means method). The purpose of the cluster analysis was to identify similarities among factors among the included 614 participants by distance. Euclid's algorithm was used to calculate the original distances, and Ward's method was used to calculate the distances after merges. Participants were classified into groups with similar characteristics. Figure 6 is a dendrogram illustrating the results of the cluster analysis.

In this dendrogram, the lower the grouping, the higher the level of detail used in the cluster analysis. Clusters at the bottom have all factors independent. Figure 6 classifies participants into 50 clusters. In the cluster analysis, the characteristics of each cluster were read from top to bottom from the dendrogram. Because characteristics could be clearly distinguished for the 8 cluster case, 8 was adopted as the number of plasterer types. We conducted a cross-tabulation with each question to determine the characteristics of each cluster. The results are given by cluster. We named the plaster type of each cluster according to the resulting characteristics. The type names and characteristics are given as (1) to (8) below. (*N* represents the number of participants.)

1. Middle-standing plasterer type (Number of participants = 139)

This cluster consists mainly of middle-standing plasterers in their thirties with 10 years or more of experience as plasterers. These plasterers play the core role among plasterers. Plasterers in this cluster can be further separated into those brushing up on their skills to become "Chiefs of organization" (64.2%) and those planning futures as "Advanced-level plasterers (master or expert)" (32.8%).

2. Middle-standing experienced field worker type (Number of participants = 102)

This cluster consists of plasterers in their forties with 20 years or more of experience as plasterers. Among them, the percentage of experienced plasterers (supervisors and senior supervisors) is particularly large, 84.4%. In the plastering industry, they have positions as work-site managers. Plasterers in this cluster prefer the status quo and

wish to maintain a stable living by keeping their positions as master or supervisor. They do not have much expectation of promotion or independence.

3. Middle-standing leader type (Number of participants = 83)

This cluster consists mainly of middle-standing plasterers in their forties but also includes ones in their thirties with 10 to 20 year of experience as plasterers. Plasterers in this cluster are business owners, vocational trainers, and part-time college lecturers who strongly desire to be independent plasterers or instructors. Their aim is not to join the management of their organizations but rather to develop their own unique styles of plastering.

4. Older, experienced supervisor type (Number of participants = 73)

This cluster consists of older plasterers, mainly plasterers in their fifties, with 31 years or more of experience as plasterers. This cluster includes many plasterers who entered this industry in the high-growth period. They have careers as experienced plasterers but have not yet established positions as business owners or other specialists. Despite their long careers, their salaries are not very different from those of younger plasterers and they are uncertain about their future plans.

5. Older, experienced master type (Number of participants = 58)

This cluster consists mainly of plasterers in their sixties. Of the plasterers, 62.9% own businesses and have established positions. Plasterers in this cluster are mostly successful independent business owners. They became plasterers because they appreciated the profession and the contents of the work (e.g., "Yearned for plastering skills", "No work more attractive than plastering"). Their current degree of satisfaction is high.

6. Skill-pursuing independent type (Number of participants = 57)

This cluster includes a wide range of ages and careers. Participates identifying themselves as "Daily or temporary employee" made up 33.3% of this cluster, and few had experience as plastering site supervisors. Many plasterers in this cluster did not belong to any organization and typically worked alone. They reported that they were very concerned about low income and unstable employment. They were originally positive about plastering (e.g., "Yearned for plastering skills", "Expected higher income") but now are uncertain about what to do.

7. Construction engineer type (Number of participants = 55)

This cluster consists of plasterers in their aged 30 to 49 years with 10 to 20 years of experience as plasterers. The plasterers in this cluster typically inherited their occupation. Frequent responses in this cluster were "Plasterer's child" (74.4%) and "Business owner" (42.6%). Their dissatisfaction with their current profession is high. By obtaining national qualifications as architects and construction management engineers, these participants were aggressively working as subcontractor management engineers, not mere plasterers, and were using their technical plastering skills for non-plastering purposes.

8. Young employee type (Number of participants = 33)

This cluster consists mostly of plasterers in their twenties (69.7%) and/or plasters with 10 years or less of experience (66.7%). Almost all of these participants are company employees (93.9%). They have guaranteed positions as employees but are still growing as plasterers. They report no problems and have rather high degrees of satisfaction. Plasterers in this cluster can be further separated into those who are management-oriented and those who are skill-oriented (e.g., "Manager", 51.5%, "Master", 21.2%, and "Artist", 21.2%).

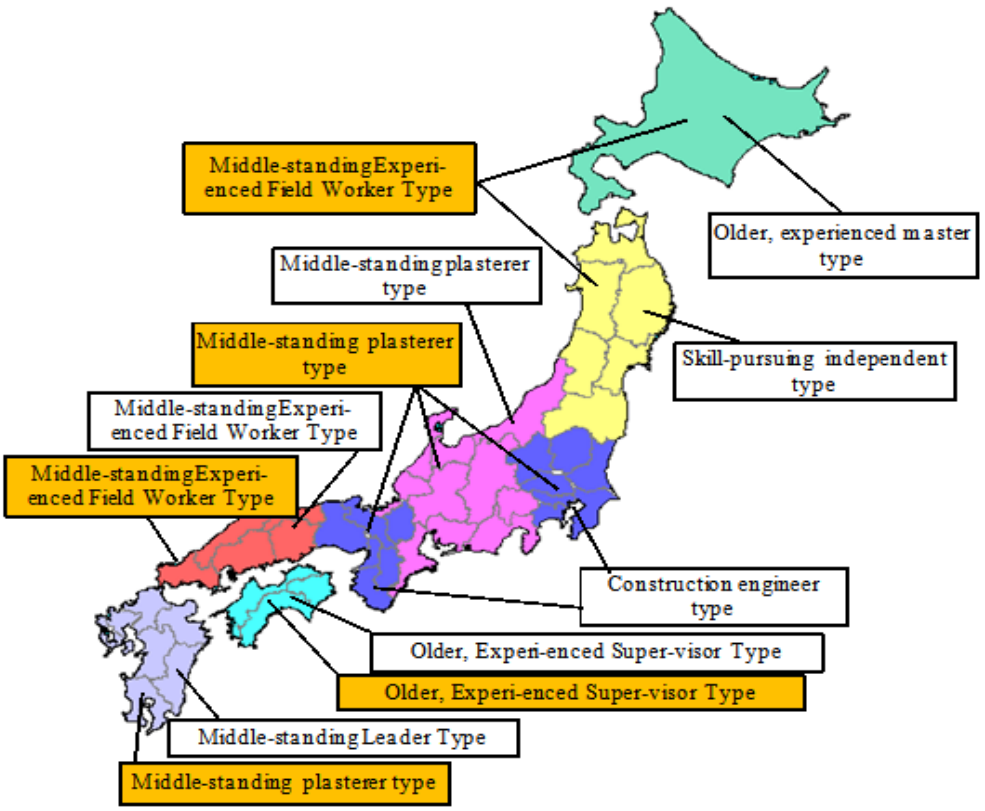
DISCUSSION OF REGIONAL DIFFERENCES IN PLASTERERS IN JAPAN

Table 3 shows the results of cross-tabulating 8 clusters and 10 regional blocks in Japan. The regional differences of plasterers in 10 regional blocks of Japan are shown as percentages of participants in each cluster by region. Figure 7 shows the regional differences of senior plasterers by type (cluster) and their distribution within Japan.

Table 3. Results of cross-tabulating 8 clusters and 10 regional blocks.

Upper row: number of participants Lower row: (%)		8 Clusters								
		Total	Middle-standing Plasterer Type	Middle-standing Experienced Field Worker Type	Middle-standing Leader Type	Older, Experienced Supervisor Type	Older, Experienced Master Type	Skill-pursuing Independent Type	Construction Engineer Type	Young Employee Type
10 Regional Blocks	Total	614 100.0	139 22.6	102 16.6	85 13.8	80 13.0	63 10.3	57 9.3	55 9.0	33 5.4
	Kanto	89 100.0	19 21.3	12 13.5	7 7.9	9 10.1	11 12.4	12 13.5	15 16.9	4 4.5
	Tohoku	41 100.0	6 14.6	9 22.0	7 17.1	5 12.2	2 4.9	8 19.5	2 4.9	2 4.9
	Kinki	78 100.0	19 24.4	16 20.5	11 14.1	3 3.8	7 9.0	6 7.7	11 14.1	5 6.4
	Hokkaido	64 100.0	7 10.9	13 20.3	10 15.6	12 18.8	10 15.6	7 10.9	2 3.1	3 4.7
	Koshin-etsu	59 100.0	19 32.2	7 11.9	9 15.3	7 11.9	8 13.6	1 1.7	4 6.8	4 6.8
	Hokuriku	53 100.0	14 26.4	2 3.8	8 15.1	7 13.2	4 7.5	8 15.1	5 9.4	5 9.4
	Shikoku	38 100.0	6 15.8	6 15.8	6 15.8	10 26.3	4 10.5	2 5.3	4 10.5	– –
	Chugoku	55 100.0	13 23.6	16 29.1	6 10.9	9 16.4	6 10.9	4 7.3	– –	1 1.8
	Tokai	53 100.0	20 37.7	10 18.9	7 13.2	5 9.4	1 1.9	3 5.7	3 5.7	4 7.5
	Kyushu	84 100.0	16 19.0	11 13.1	14 16.7	13 15.5	10 11.9	6 7.1	9 10.7	5 6.0

Figure 7. Regional differences in plasterers by type (cluster) and their distribution within Japan. *(Approved by Geospatial Information Authority of Japan: 2001 - No. 367.)*



EDUCATION THAT SHOULD BE PROVIDED AT THE SKILLED LEVEL IN RELATION TO CURRENT EDUCATION

The following analysis method summarized 15 technical skill education types at the skilled level in the 10 regional blocs into tables in order to identify gaps in relation to national averages, and to compare and investigate these figures. Table4 summarizes education that should be provided at the skilled level in relation to current education by regional bloc. When examining the total points in relation to the current situation, rather than 0 point, to obtain a general consensus regarding what should be included in worker education at the skilled stage, two types of education that were found to be satisfactory are “on-site OJT” and “courses at professional training schools”.

Future education should Of the top three⇒1, Everything else ⇒0	On-site OJT	Direct guidance from people with high-level skills	Direct on-site guidance in plastering skills from the master or boss	Company group training	Provision of textbooks and materials	Company study groups	Courses at professional training schools	Acquisition of skills at educational institutions	Classes provided by the JPA and others	on-site classes provided by building products manufacturers and local NPO groups	Interaction with people in the same profession at other companies	Enjoying work and acquiring skills in the process	Acquiring skills primarily by using traditional building methods for on-site work	Acquiring skills primarily by using contemporary building methods for on-site work	Other
HOKKAIDO	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0
TOHOKU	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0
KO-SHINETSU	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
KANTO	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
TOKAI	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0
HOKURIKU	0	1	0	0	0	0	0	0	0	1	1	0	1	0	0
KINKI	0	0	0	0	0	1	0	1	0	0	1	0	0	0	0
SHIKOKU	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0
CHUGOKU	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0
KYUSHU	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0
TOTAL	0	5	1	1	1	2	0	3	1	3	5	1	3	1	0
Three or more points	–	O	Δ	Δ	Δ	Δ	–	O	Δ	O	O	Δ	O	Δ	–
0 points	O	–	–	–	–	–	O	–	–	–	–	–	–	–	O

Table4 Summarizes education that should be provided at the skilled level

CONCLUSION

This study produced the following results:

1. The classification of senior plasterers was presented to be used as the foundation of various discussions about the technical education of plasterers throughout Japan.
2. The basic characteristics of senior plasterers in all regions were presented and senior plasterers were analyzed using cluster analysis.
3. The characteristics of senior plasterers throughout Japan were presented and the regional differences of senior plasterers and plasterers in 10 regional blocks were shown.
4. It was confirmed that in the Kanto and Kinki blocs, where the major cities of Tokyo and Osaka are located, Off-JT is being introduced into the education methods, so that the main form of education is developing into a combination of OJT and Off-JT.

The results from (1) to (4) above provide basic information about plasterers. They are applicable to various efforts at training young plasterers and promoting the handing down of plastering skills from senior plasterers implementing technical education for plasterers by region or labor area.

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