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An Efficient Method for Finding Improvements in Japanese Management Training Programs Using Text Mining

Kyoko Hayashi (Corresponding author)

Faculty of Business Administration, GLOBIS University

5-1 Niban-cho Chiyoda-ku 102-0084, Tokyo, Japan

Tel: 81-3-5275-3650 E-mail: kyoko.hayashi@globis.ac.jp

Kazuhiko Tsuda

Faculty of Business Science, University of Tsukuba

3-29-1 Otsuka Bunkyo-ku 112-0012, Tokyo, Japan

Tel: 81-3-3942-6918 E-mail: tsuda.kazuhiko.gn@u.tsukuba.ac.jp

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Abstract

While changes in the business environment are accelerating, working life is lengthening as we enter an era of 100-year lifespans, making it necessary for working adults to continually improve their skills. Training for working professionals is becoming increasingly important, and educational institutions continuously strive to improve their training programs. However, it is difficult to efficiently extract important information from the vast number of participant satisfaction survey comments for the purpose of program improvement. In this study, we used text mining to examine how to efficiently retrieve important information from comment data of satisfaction surveys on management training programs in Japan. In general, a method for extracting dissatisfaction from the polarity of words in comments has been considered. Nonetheless, the analysis results confirmed that even when describing dissatisfaction or demands expressions, Japanese managers do not use straightforward expressions, but rather characteristic expressions. Based on an understanding of their politeness and considerate expressions, we learned that extracting and utilizing keywords from the comments of a small

group was effective in efficiently detecting the overall dissatisfaction and demand expressions. It was also discovered that the same working adults used different words to express dissatisfaction and demands, depending on their job positions. Using these novel study findings, essential improvements can be efficiently explored from post-training satisfaction questionnaires, contributing to improving the quality of education for working adults in the future.

Keywords: Management training, Satisfaction survey, Evaluative expressions, Demand expressions, Politeness, Considerate expressions, Text mining

1. Introduction

Life expectancy is increasing, leading to longer working lives against the backdrop of the 100-year life expectancy era (Gratton & Scott, 2016). Japan's aging population prompted a revision of the corporate sector's retirement age in 2021. As a consequence, their business environments and roles change more frequently, demanding skills in the workplace. Therefore, companies and employees should continue to learn and grow after entering the workforce, and education for working adults is becoming increasingly important.

Many educational institutions strive to provide high-quality educational programs for working professionals. They conduct surveys after each course to determine students' satisfaction and demands, which are used to improve their academic programs. When several thousand people attend a course annually, quantitative information can be processed efficiently and objectively. However, qualitative comment data tends to be interpreted and processed by teachers and staff in an insufficient manner.

Therefore, this study investigates methods to efficiently obtain information that can contribute to improving educational programs for working professionals. Using text data from post-attendance questionnaires on training programs for managers, we propose a knowledge discovery method to determine the procedures that can be used to analyze the data and easily derive hints for improving training programs. Furthermore, we verify the effectiveness of the proposed method by comparing it with other methods. In addition, we confirm whether differences exist in expressions among working adults depending on their work experience and position, as well as a method for determining whether demands should be adopted based on such expressions.

2. Previous Studies

2.1 Evaluation and Improvement of Higher Education

In addition to university students, the need for high-quality higher education is expected to grow as working people seek various forms of learning in recent years (Nakahara, 2021). Therefore, considerable research on the following has been conducted to evaluate and improve educational services from multiple perspectives.

Nicol (2010) noted that university students were dissatisfied with faculty feedback on their submitted assignments and proposed ways to improve the quality of feedback and dialogue without increasing the burden on faculty, even with a substantial student population.

Additionally, Gruber et al. (2010) developed a tool to measure student satisfaction and improve higher education services across various aspects of student life, because German universities wanted many students to obtain not only bachelor's but also master's degrees; therefore, they needed to treat students as customers and maintain their satisfaction.

Based on their research on MBA and university students, Kolb and Kolb (2005) stated that an enhanced learning environment is necessary to promote experiential learning. They asserted that institutions must develop their organizations to constantly interact with their stakeholders to evaluate and improve the learning environment and the value of their programs.

2.2 Content Analysis and Text Mining

The method of analyzing qualitative data such as text, audio, and video is called content analysis. According to Higuchi (2014), with the development of computer-based natural language processing technology, quantitative text analysis methods that ensure objectivity and reproducibility while retaining the advantages of qualitative research have been developed, making it easier to conduct text mining research using large amounts of data. The development of text-mining tools for the Japanese language has progressed, and Higuchi's KH Coder is one of the most widely used free tools. Meanwhile, paid services include NTT Data Mathematical Systems' Text Mining Studio, which offers a wide range of analysis functions, and Language Understanding Laboratory's Emorepo, which has strengths in sentiment analysis in Japanese.

2.3 Evaluative Expressions

Analysis to extract people's opinions from data such as survey comments is called reputation or sentiment analysis (Liu, 2012; Yi et al., 2003). Kanayama and Nasukawa (2005) called especially favorable and unfavorable opinions "reputation expressions" and stated that extracting, classifying, and organizing them provides valuable information for users and providers of the subject matter.

Tseng et al. (2018) used such an analysis in higher education and studied how to analyze and utilize the comments of university students' teacher evaluation questionnaires through sentiment analysis to select excellent university teachers.

Kobayashi et al. (2005) and Higashiyama et al. (2008) focused on the polarity of evaluative expressions and created a dictionary of the Japanese evaluative polarity of substantives and inflections. Okada et al. (2015) argued that reputation expressions can be effectively extracted by focusing on sentence patterns based on evaluative expressions such as adjectives and adjectival verbs and functional expressions related to sentence structures such as auxiliary verbs.

2.4 Demand Expressions

In addition to evaluation information, questionnaires sometimes contain opinions on demands. According to Kanayama and Nasukawa (2005), these are called "demand expressions." Demand expressions are not easily expressed in specific phrases; in Japanese, intent is often expressed at the end of a sentence.

According to Inoue (2006), the semantic content of a sentence comprises two parts: propositional content, which is objective semantic content, and modality, which is subjective semantic content. This modality often expresses demand. Modality expressions in Japanese include 1) predicate conjugations, 2) sentence adverbs (adverbs that correspond to the expressions that follow the sentence), 3) sensory verbs and interjections, and 4) intonation.

2.5 Politeness and Considerate Expressions

Humans are social animals and building good relationships with others is essential for social life. Brown and Levinson (1987) focused on "face," a basic human need for relationships, and defined politeness as linguistic behavior that does not threaten the other person's face. In addition, politeness strategy refers to the kind of language behavior that is chosen in a given situation. Leech (1983) states that the principle of politeness involves behavior that seeks to maximize what is desirable (benefit, praise, agreement) and minimize what is undesirable for the other party (burden, blame, disagreement), and he lists six types of principles.

Yamaoka et al. (2010) defined considerate expressions as verbal expressions used in interpersonal communication that consider the need to maintain interpersonal relationships. Yamaoka (2018) proposed a system for organizing considerable Japanese expressions consisting of formal classification based on parts of speech and functional classification based on aims and purposes. Furthermore, he organized these classifications in accordance with Leech's (1983) six principles of politeness.

2.6 Research on Satisfaction Surveys

Many companies and organizations conduct customer satisfaction surveys after offering a product. However, there is much debate over how to interpret the quantitative results of satisfaction surveys. According to Oliver (2010), the results tend to be biased toward higher scores. Meanwhile, customer loyalty studies show a significant difference between the satisfaction of customers who score highest and those who score second highest. For example, according to Heskett et al. (1994), the repurchase rate of customers who gave Xerox's product a next-level satisfaction rating of 4 was one-sixth of that of customers who gave it the highest satisfaction rating of 5. Taketani and Watari (2015) applied this study to improve university lectures. By analyzing and comparing the evaluation comments of the highest and second highest-scoring groups in a course satisfaction survey, they found that the second highest scoring group's statements contained more information that could lead to improvement.

Hayashi and Tsuda (2022) analyzed the post-training satisfaction questionnaires for section managers of Japanese companies with a certain level of working experience. The responses were divided into three groups for each level of satisfaction (high satisfaction: 5 points; medium satisfaction: 4 points; and low satisfaction: 1-3 points). As in Oliver's (2010) studies, the headcount was skewed toward the high-satisfaction group, with 62.03% in the high-satisfaction group, 34.60% in the medium-satisfaction group, and 3.38% in the low-satisfaction group. The dissatisfaction and demands expressed in the comments were almost identical for the high- and medium-satisfaction groups but differed for the

low-satisfaction group. Meanwhile, the comments in the low-satisfaction group contained characteristic expressions used by middle managers. Therefore, words expressing dissatisfaction and demands were extracted from the text data of the low-satisfaction group—a small group—and the comment data of the medium-satisfaction group were searched using these words as keywords to identify targets of improvement requests. Finally, the targets of improvement requests for 96.62% of the participants, including the high-satisfaction group, were efficiently extracted.

3. Methods for Efficiently Finding Training Improvements

As mentioned above, Hayashi and Tsuda (2022) found that the keywords of evaluative and demand expressions extracted and utilized from the texts of the smallest number of low-satisfaction groups effectively discovered areas for improvement in the training programs for section managers. However, because the employee base of a company is broad, it is desirable to confirm the effectiveness of the proposed method with different groups of employees. Therefore, in this study, we conducted the same analysis for training department managers who are higher than section managers in the organization and confirm the generality of Hayashi and Tsuda's (2022) method.

Simultaneously, we aimed to extract keywords from the comments of the low-satisfaction group, which can easily lead to more accurate dissatisfaction or demand expressions. For this purpose, we reviewed previous studies on Japanese language expressions and actual survey comments to determine a method for extracting words that express dissatisfaction or demand with higher precision.

3.1 Data Used

Quantitative evaluation and free text data of satisfaction questionnaires were submitted by participants with an average age of 51 years who attended a training course for department managers at Business School A in Japan. The training for department managers, consists of 12 three-hour lectures over three months, covering a wide range of areas, with participants from several companies. Training for section managers, the subject of a previous study, was conducted in a similar format. The details are as follows:

(1) Extraction of words that quickly led to dissatisfaction and demands for training of department managers: This was based on comment data from participants who attended the training for department managers at Business School A in 2021-22 and selected 1-3 out of 5 points in the post-training satisfaction questionnaire. The dataset consisted of 22 data points. Because the number of department managers who are upper-level managers is generally smaller than that of section managers, the number of department managers attending training is also smaller than that of section managers. Therefore, it was considered appropriate to use the same amount of data as in the training analysis for section managers. The period covered in this analysis was extended to several months to supplement the amount of data.

(2) Analysis of keywords expressing dissatisfaction with and demands for department manager training, and identification of targets for improvement: Text data of quantitative evaluations and free descriptions of satisfaction questionnaires were submitted by 461

participants in the training of department managers at Business School A in 2021. The amount of data for each satisfaction level is listed in Table 1. As expected from previous studies, the quantitative responses were biased toward high satisfaction levels.

Table 1. Satisfaction and headcount ratio of department managers

Satisfaction Level	Number of People	Percentage
5	295	63.99%
4	156	33.84%
3	8	1.74%
2	2	0.43%
1	0	0.00%
Total	461	100.00%

The data were divided into three groups according to satisfaction levels: satisfaction level 5 was the high-satisfaction group, satisfaction level 4 was the medium-satisfaction group, and satisfaction levels 1-3 were the low-satisfaction group. The proportion of each group was 63.99% for high satisfaction, 33.84% for medium satisfaction, and 2.17% for low satisfaction, similar to the section manager analysis.

3.2 Analysis Tools

This study used MeCab as the morphological analysis engine and KH Coder and UserLocal Text Mining Tool as the text-mining tools.

3.3 Keyword Extraction Criteria that Easily Leads to Dissatisfaction and Demands

Hayashi and Tsuda (2022) focused on the parts of speech commonly used in evaluative and demand expressions and limited their analysis to adjectives, adjectival verbs, negative auxiliary verbs, and adverbs; they collected words of these parts of speech that appeared in the comments of the low-satisfaction group. An analysis was conducted to check and scrutinize the sentences containing these words.

Before analyzing the data of the department managers, we visually reviewed the text. Compared to the data for section managers, there were fewer instances of direct expression of dissatisfaction, even when the quantitative satisfaction level was low. In addition, there were some cases in which the dissatisfaction was followed by a sentence that softened the negative impression, such as “But it may be my personal preference,” or euphemistically expressed demand expressions without using negative words, such as “I would appreciate it more if ...” These were interpreted as considerate expressions based on a politeness strategy. It was assumed that department managers, who were selected as managers above section managers

in the organization, also possessed interpersonal skills, and it was inferred that they aim to minimize undesirable elements (burden, blame, and disagreement) among Leech's (1983) politeness principles.

Therefore, we used Yamaoka's (2018) classification of considerate expressions and reexamined the keyword extraction criteria in this study. The formal classification of considerate expressions includes adverbs, adverb phrases, adjectives, adjective phrases, suffixes, auxiliary verbs, sentence-final expressions, and idiomatic sentences. Adverbs and adjectives were already adopted in our keyword extraction criteria. In addition, demand expressions overlap with considerate expressions because they are not easily expressed in specific phrases and are often used at the end of sentences in Japanese to indicate intentions. Therefore, this study focused on auxiliary verbs often used at the end of sentences in Japanese. Among them, "TAI," which expresses wishes in Japanese, and "TARA," the hypothetical form of "TA," which represents past and completed states, were used for such expressions as "I would be happy if ..." and were added to the keyword extraction criteria. Furthermore, Yamaoka (2018) identified seven categories for functional classification: benefit, burden, mitigation, praise, humility, agreement, and sympathy. Thus, we identified mitigating expressions in the functional classification of considerate expressions, such as (1) infringement suppression (may, instead, cannot say, a little, etc.) and (2) disagreement avoidance (may, towards, in terms of, etc.), in the comments of the department manager's level. The expression "may," which is used in both (1) and (2) and often appears in actual comment data, is noteworthy, but was already included in the keyword extraction criteria because it contains a negative auxiliary verb in Japanese. In addition, it was confirmed that "a little bit" of infringement suppression and "somewhat" and "a little more" of the same meaning are also adverbs and have already been adopted in the criteria.

Hayashi and Tsuda (2022) focused on using the adjective "good" in their analysis of section managers. Although the polarity of the word "good" itself is positive, there were more examples of actual dissatisfaction or demand expressions, such as "~would be better." Therefore, in the present analysis, we decided to extract keywords by identifying only the parts of speech without focusing on the polarity of the word.

In conclusion, the standard parts of speech for selecting keywords for negative evaluative expressions and demand expressions from the comments of a small number of low-satisfaction groups were adjectives, adverbs, negative auxiliary verbs (NAI, N, NU), desired auxiliary verbs (TAI), and the hypothetical form of the past perfect auxiliary verb (TARA). These Japanese auxiliary verbs are difficult to translate into English; therefore, they are listed hereafter as written as they sound. These factors are listed in Table 2.

Table 2. List of auxiliary verbs to be used as keywords

Part of speech	Japanese	Usage
negative auxiliary verbs	NAI, N, NU	no
desired auxiliary verbs	TAI	I would like you to ...
hypothetical form of the past perfect auxiliary verbs	TARA	I would be happy if it were …

This method of selecting keywords is called “the politeness method” in this study because it uses the principle of politeness and considerate expressions systematically organized by Yamaoka (2018).

3.4 Analysis Procedure

The analysis procedure is shown in Figure 1 and explained in the text.

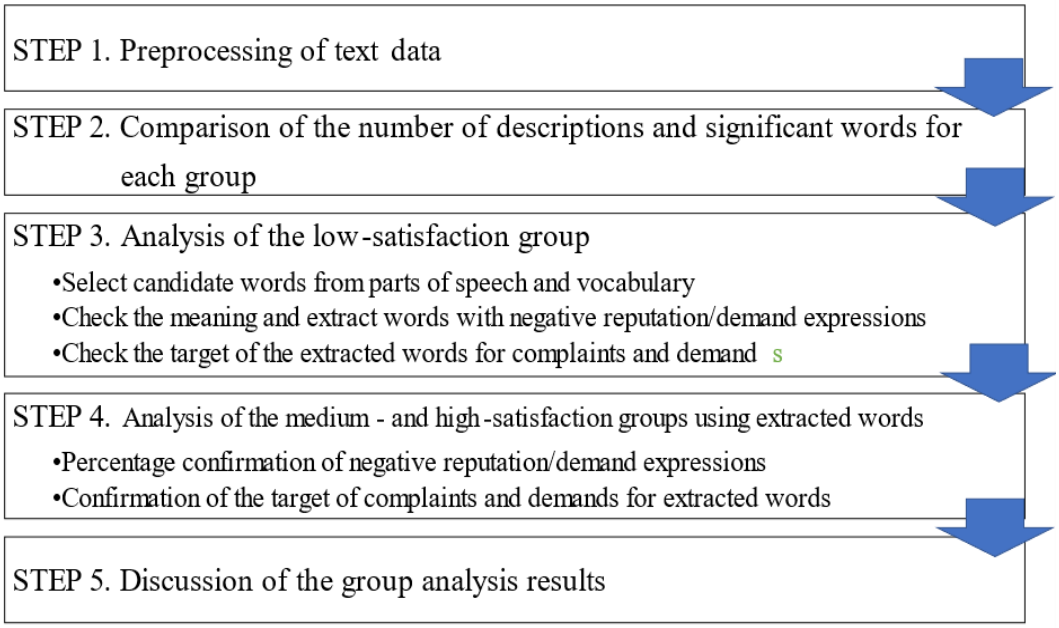

Figure 1. Analytical procedure

STEP 1. Preprocessing of text data: Using the MeCab morphological analysis system, a morphological analysis of all text data was performed, and a list was created for each part of the speech. Notational distortions were corrected for a unified description of the original data. Compound words were registered with KH Coder and extracted forcibly.

STEP 2. Comparison of the number of descriptions and significant words for each group: Check whether the number of comments differs significantly because of differences in

satisfaction levels, which may interfere with the results of the analysis. Then, word cloud analysis was performed using the UserLocal Text Mining Tool to obtain an overview of the data for each group before analyzing them in detail in the subsequent steps.

STEP 3. Analysis of the Low-Satisfaction Group: After the survey, comments in the low-satisfaction group were classified by part of speech using the KH Coder, and only words with the part of speech defined by the politeness method were extracted. The KWIC (Key Word in Context) concordance function was then used to check the words before and after the candidate words in the text to identify those used as negative reputation expressions or demand expressions. To prevent this identification from being biased by the researcher's subjectivity, we asked ten experts in adult education to look through the text and censor the identification to ensure its appropriateness before creating the keyword list. Meanwhile, we identified and recorded the subjects of dissatisfaction and demands for each extracted word.

STEP 4. Analysis of the medium- and high-satisfaction groups using extracted words: Using the keyword list from STEP 3, we searched the text data for the medium- and high-satisfaction groups and checked the percentage of words used as negative reputation/demand expressions. If it was an expression of dissatisfaction or demand, we confirmed and recorded the target of dissatisfaction or demand.

STEP 5. Discussion of the group analysis results: We compared how many of the words extracted from the small number of low-satisfaction groups were similar to the many medium- and high-satisfaction groups, and what the targets of dissatisfaction and demands were for each group. We examined whether using data from the low-satisfaction group as a sample contributes to deriving information that leads to improvements from the overall data. If a certain contribution was confirmed, we derived knowledge of the specific terms to be analyzed as keywords to contribute to a more efficient improvement in training programs.

3.5 Confirmation of Descriptive Statistics and Significant Words

Table 3 shows the comparative data of the three groups by satisfaction level, which was conducted according to the procedure described in STEP 2. Compared with the ratio of the number of respondents, the ratio of the high-satisfaction group was slightly lower in terms of the number of words. However, the number of sentences was almost the same as the ratio of the number of respondents, which confirmed that there was no problem comparing the groups.

Table 3. Number of people per group and amount of description

Group	Satisfaction Level High	Satisfaction Level Medium	Satisfaction Level Low
Number of people	295	156	10
	63.99%	33.84%	2.17%
Total extracted word count	26,738	12,473	738
	54.36%	38.99%	6.65%
Total number of sentences	964	488	29
	65.09%	32.95%	1.96%

In STEP 2, we also conducted word cloud analysis for the three groups, and the results are presented in Figures 2, 3, and 4. For the word cloud analysis, UserLocal Text Mining Tool detects nouns, verbs, and adjectives, and words with higher feature scores appear larger. For the post-training satisfaction questionnaire, the word "learn" prominently appeared at the center for all groups. However, in the high- and medium-satisfaction groups, "learn" was of the same size as "able" and "think," and the next largest word was "understand," suggesting a commonality between the two groups. However, in the low-satisfaction group, the word "felt" prominently appeared, with "difficult" and "regrettable" appearing next in size. This result confirms the difference in trend from the other groups.

Figure 2. Word cloud analysis of the high-satisfaction group

Figure 3. Word cloud analysis of the medium-satisfaction group

Figure 4. Word cloud analysis of the low-satisfaction group

3.6 Extraction of Dissatisfaction/Demand Expressions Keywords from the Low-Satisfaction Group

A text-mining analysis of the data presented in <3.1> (1) was conducted, and only the parts of speech defined by the politeness method were extracted. Next, the text of the comments containing these words was reviewed and narrowed down to words that were indeed expressions of dissatisfaction or demand, and 35 words were identified. Table 4 lists the list of words.

Table 4. Selected keywords from the low-satisfaction group

Adjective	Adjectival noun	Adverb	Auxiliary verb
many	regrettable	a little more, a little less	NAI, N, NU
happy	active	a little	TAI
strong	similar	at the same time	TARA
new	very	more	
difficult	useless	somewhat	
bad	frank	further	
old	questionable	to a great extent	
few	enough	not much	
not easy		not so much	
hard		by all means	
low			
fast			
unavoidable			
no			

As 24 words were extracted during the section manager analysis, it was found that department managers also used richer vocabulary when expressing their dissatisfaction or demands. Among them, there were eight adjectives for department managers compared to two for section managers, and ten adverbs for department managers compared to six for section managers. Because adverbs are used in infringement suppression during the mitigation of considerate expressions, it is assumed that the section manager may have applied the politeness principle to reduce the impression of blame that the reader receives.

3.7 Analysis of Application of Keywords to Medium and High-satisfaction Groups

Thirty-five words extracted from the department manager's low-satisfaction group were searched in the data of the medium- and high-satisfaction groups to determine whether they expressed dissatisfaction or demand expressions. The list is presented in Table 5.

Table 5. Comparison of the extracted words in the three groups

Keyword	Part of speech	Medium-Satisfaction Group			High-Satisfaction Group		
		Total number of appearances	Aappearances in complaints or requests	Percentage of dissatisfaction or requests	Total number of appearances	Aappearances in complaints or requests	Percentage of dissatisfaction or requests
many	Adjective	39	21	53.85%	48	4	8.33%
happy	Adjective	0	0	NA	0	0	NA
strong	Adjective	8	1	12.50%	12	0	0.00%
new	Adjective	5	5	100.00%	4	1	25.00%
difficult	Adjective	10	8	80.00%	8	1	12.50%
bad	Adjective	0	0	NA	2	0	0.00%
old	Adjective	8	8	100.00%	3	3	100.00%
few	Adjective	6	3	50.00%	5	1	20.00%
not easy	Adjective	5	5	100.00%	1	1	100.00%
hard	Adjective	8	6	75.00%	4	3	75.00%
low	Adjective	0	0	NA	5	1	20.00%
fast	Adjective	2	0	0.00%	4	1	25.00%
unavoidable	Adjective	5	5	100.00%	3	2	66.67%
no	Adjective	25	3	12.00%	65	7	10.77%
regrettable	Adjective verb	11	11	100.00%	17	17	100.00%
active	Adjective verb	1	1	100.00%	4	2	50.00%
similar	Adjective verb	1	0	0.00%	0	0	NA
very	Adjective verb	24	2	8.33%	74	1	1.35%
useless	Adjective verb	0	0	NA	0	0	NA
frank	Adjective verb	1	0	0.00%	0	0	NA
questionable	Adjective verb	1	1	100.00%	0	0	NA
enough	Adjective verb	10	5	50.00%	4	0	0.00%
a little more, a little less	Adverb	18	15	83.33%	16	8	50.00%
a little	Adverb	1	1	100.00%	1	1	100.00%
at the same time	Adverb	1	0	0.00%	0	0	NA
more	Adverb	12	7	58.33%	17	9	52.94%
somewhat	Adverb	4	4	100.00%	0	0	NA
further	Adverb	11	7	63.64%	27	1	3.70%
to a great extent	Adverb	0	0	NA	0	0	NA
not much	Adverb	0	0	NA	4	2	50.00%
not so much	Adverb	0	0	NA	0	0	NA
by all means	Adverb	1	1	100.00%	2	0	0.00%
NAI, N, NU	Auxiliary verb	130	53	40.77%	187	24	12.83%
TAI	Auxiliary verb	23	9	39.13%	45	10	22.22%
TARA	Auxiliary verb	2	1	50.00%	8	1	12.50%

Note. Shaded areas indicate unsatisfactory demands in more than half of the cases.

In addition, Table 6 presents a recalculation of the section manager's analysis using the politeness method, and a corresponding tabulation of the department manager's analysis.

Table 6. Comparison of section manager analysis and department manager analysis

	Section Manager		Department Manager	
	Number	Percentage	Number	Percentage
Words used by low-satisfaction gr. for complaints or requests	24	100.00%	35	100.00%
Words used in the same way in more than half of the probability in the medium satisfaction mgr.	14	58.33%	19	54.29%
Words used in the same way in more than half of the probability in the high satisfaction mgr.	8	33.33%	10	28.57%

Of the keywords that expressed dissatisfaction or demand expressions in the low-satisfaction group of department managers, 19 (54.92%) were used in the medium-satisfaction group in a similar manner more than half the time, and ten words (28.57%) were used in the high-satisfaction group. Although the percentage of words used in the high-satisfaction group was slightly lower than that in the analysis of section managers, more than half of the words were easily connected to dissatisfaction/demands, especially in the runner-up medium-satisfaction group, which contains important information for improving training programs.

3.8 Comparison of Improvement Targets among the Three Groups of Department Managers

When checking the occurrence of keywords that were likely to be used to express dissatisfaction or demand in the text, we tabulated the target of the expression. Table 7 shows the comparison of the three groups.

Table 7. Comparison of the extracted words in the three groups

	Low-Satisfaction Group		Medium-Satisfaction Group		High-Satisfaction Group	
Reputation and request content	Appearances	Percentages	Appearances	Percentages	Appearances	Percentages
Less time, more volume of learning, want to learn carefully	0	0.00%	30	16.48%	15	14.85%
Course materials: outdated, insufficient, difficult to understand	3	9.38%	52	28.57%	18	17.82%
Program and lecture content itself	6	18.75%	23	12.64%	5	4.95%
Lack of learning and interaction among members	6	18.75%	29	15.93%	37	36.63%
Pre-assignments: Not enough reflection in lectures, too much workload	2	6.25%	5	2.75%	0	0.00%
Too many participants	0	0.00%	5	2.75%	0	0.00%
Lecture Environment	0	0.00%	0	0.00%	3	2.97%
Online lecture format	3	9.38%	13	7.14%	14	13.86%
Lecturers	1	3.13%	12	6.59%	3	2.97%
Opportunities and points for comments	11	34.38%	5	2.75%	3	2.97%
Time and day of the week	0	0.00%	4	2.20%	3	2.97%
Responsiveness of the office	0	0.00%	4	2.20%	0	0.00%
Total	32	100.00%	182	100.00%	101	100.00%

Note. Shaded areas are the top three opinions.

As in the section manager analysis, the top three targets for improvement for the medium- and high-satisfaction groups were the same, although their rankings were slightly different: “Course materials: outdated, insufficient, difficult to understand,” “Less time, more volume of learning, want to learn carefully,” and “Lack of learning and interaction among members.” However, the low-satisfaction group’s desire for improvement differed from that of the other two groups. Of the top three, only “Lack of learning and interaction among members” was the same. The remaining two were unique to this group: “opportunities and points for comments” and “programs and lecture content.” These trends are consistent with the analysis results of the section managers. Since the low-satisfaction group comprised a minority of both department and section managers, accounting for only 2-3% of the total, it was interpreted that the content of the opinions held was also in the minority.

In conclusion, it was confirmed that in department manager training, the opinions of the medium-satisfaction group (33.84% of the total) were similar to those of the high-satisfaction group (63.99%).

3.9 The Generality of Efficient Method for Finding Areas for Improvement Based on Satisfaction Surveys of Management Training Programs

These results confirm that the method for efficiently identifying areas for improvement in

training programs that Hayashi and Tsuda (2022) found for section managers is effective for department managers. In other words, words that quickly led to dissatisfaction/demands were identified in the low-satisfaction group (2.17% of the total). Next, using the specified words as keywords, we analyzed the data of the most satisfactory group (33.84% of the total), which was expected to contain adequate improvement information and identified targets for improvement. The improvement targets were equal to those of the high satisfaction group (63.99%). As a result, 97.83% of the participants' improvement demands were identified, confirming a certain level of versatility.

3.10 Keywords for Efficiently Retrieving Dissatisfaction and Demand Information from Management Training Satisfaction Surveys and Differences by Position

Combining the analysis of the previous section on manager training with the results of this analysis of department managers, we selected words that expressed dissatisfaction or demand in more than half of the medium- and high-satisfaction groups, in addition to the low-satisfaction group, as shown in Table 8. Some words appeared in common, whereas others appeared in only one of the two groups. The word "want," which appears only in section managers, is a straightforward demand expression, and it was inferred that it is used only by section managers and below. Words that appear only in department managers are also interesting. The words "I do not think I had a choice" are used in combination with expressions of dissatisfaction, such as "I do not think I had a choice, but I would have appreciated it more if it were~," which is a politeness principle aimed at minimizing blame to the other party and can be interpreted as an expression of sympathy for the burden the other party bears. Moreover, although "active" gives a positive impression, it is a paradoxical expression of dissatisfaction with the inactivity of reality, such as "I think it would be more active if it were~." The aim is to minimize blame on the other party. The common occurrence of such words among the three groups seems to be a characteristic of department managers with extensive working experience and skills in politeness strategies.

Some words appeared in common, whereas others appeared in only one of the two groups. The word "want," which appears only in section managers, is a straightforward demand expression, and it was inferred that it is used only by section managers and below. Words that appear only in department managers are also interesting. The word "unavoidable" is used in combination with expressions of dissatisfaction, such as "It was unavoidable, but I would have appreciated it more if it were~," which is a politeness principle aimed at minimizing blame to the other party and can be interpreted as an expression of sympathy for the burden the other party bears. Additionally, although "active" gives a positive impression, it is a paradoxical expression of dissatisfaction with the inactivity of reality, such as "I think it would be more active if it were~." The aim is to minimize blame on the other party. The common occurrence of such words among the three groups seems to be a characteristic of department managers with extensive working experience and skills in politeness strategies.

Table 8. Keywords used with high probability in all groups of section managers and/or department managers

Keyword	Part of speech	Section Mgr.	Department Mgr.
needed	Adjective	○	
after all	Adverb	○	
TARA	Auxiliary verb	○	
old	Adjective	○	○
hard	Adjective	○	○
regrettable	Adjective verb	○	○
a little more, a little less	Adverb	○	○
more	Adverb	○	○
not easy	Adjective		○
unavoidable	Adjective		○
active	Adjective verb		○
a little	Adverb		○

Based on the above, specific differences in the descriptive expressions in the questionnaire depend on work experience and position, even among working adults.

The above list of keywords is a collection of words expressing dissatisfaction and demands from more than half of the respondents' medium- and high-satisfaction groups. Therefore, the above list can be used to detect useful information, even when there is insufficient time to scrutinize the keywords when extracting dissatisfaction and demands from the management training questionnaire. When the target group can be identified, the keyword lists for department managers and section managers can be used separately; even when the target group cannot be identified, it is believed that some useful information can be obtained using common keywords.

3.11 Confirmation of the Accuracy of the Keyword Extraction Method for Dissatisfactions and Demands

In Chapter 3, we confirmed the versatility of the keyword extraction method developed by the authors for identifying dissatisfaction and demands. However, to confirm the effectiveness of this method further, it was necessary to verify it objectively. Therefore, in this section, we established a comparison target to verify the accuracy of the keyword extraction method from the comments of the low-satisfaction group, which can easily lead to dissatisfaction and demand.

In Chapter 2, we explained the various text-mining tool analysis services available worldwide. In this study, Emorepo, which is particularly strong in sentiment analysis in Japanese, was selected as a target for comparison; we examined and compared the precision ratio and recall ratio for detecting dissatisfaction and demand when the same data are analyzed using the politeness and Emorepo methods.

3.12 Data Used

Some data used in the post-training satisfaction survey analysis in Chapter 3 were diverted.

(1) 24 comments from section managers (Satisfaction 1-3).

(2) 22 comments from department managers (Satisfaction 1-3).

3.13 Tools Used

(1) Emorepo, a text-mining tool from the Institute for Language Understanding, was used for comparison.

(2) MeCab was used as the morphological analysis engine to check the politeness of the method and KH Coder was used for text mining.

3.14 Analysis Procedure

The analysis procedure is shown in Figure 5 and explained in the text.

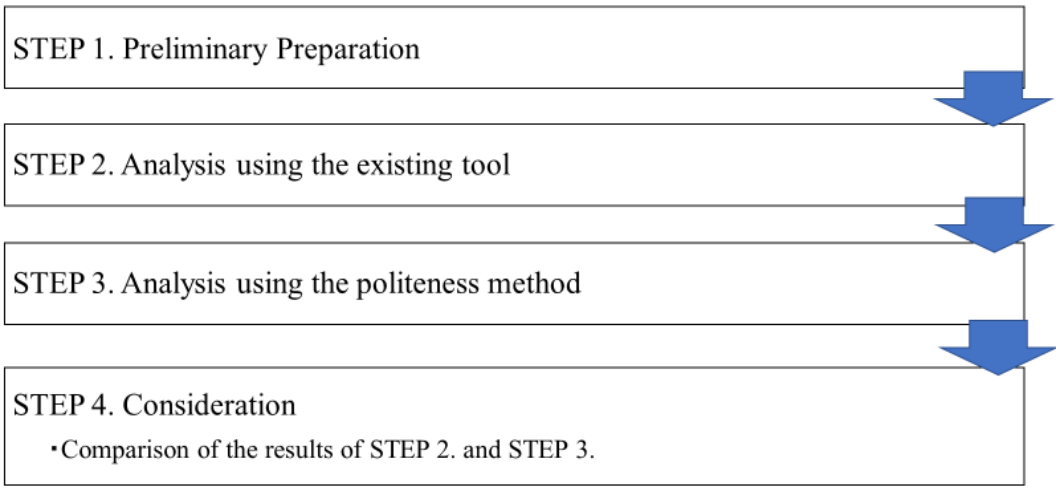

Figure 5. Analytical procedure

STEP 1. Preliminary Preparation: The text data of the section and department manager training were segmented into one sentence each and the number of sentences was checked. Next, each sentence was checked and identified to determine whether it contained information related to dissatisfactions and demands and confirm the number of sentences.

STEP 2. Analysis using the existing tool: Text data from the section manager and department

manager training programs were loaded into the existing Emorepo tool for sentiment analysis. As a result, among the sentences labeled by the existing tool as favorable, dissatisfaction, demand, and doubt, the number of nonfavorable sentences will be identified, and the precision ratio will be calculated by confirming the number of such sentences and whether the actual sentences truly express dissatisfaction or demand. The recall ratio was then checked against the number of sentences related to the actual dissatisfaction/demand, as confirmed in STEP 1.

STEP 3. Analysis using the politeness method: Morphological analysis of the text data of the section manager and department manager training was performed using MeCab, and keywords were extracted by restricting them to parts of speech in the politeness method. Next, the KH Coder's KWIC concordance function identifies the text in which the keywords appear and checks the number of sentences. Considering the main text, we checked and identified whether the sentence contained information related to dissatisfaction or demand and checked the precision ratio. The recall ratio was then checked by considering the number of dissatisfaction/demand sentences in the entire target text data, as confirmed in STEP 1.

STEP 4. Consideration: We considered the results of STEPs 2 and 3, compared them, and verified whether the effectiveness of the politeness method was objectively recognized.

4. Results

As a result of the preparatory work in STEP 1, the number of relevant sentences is as listed in Table 9.

Table 9. Summary of data for analysis

	Section mgr.	Department mgr.
Number of comment data	24	22
Number of total sentences	76	68
Sentences containing dissatisfaction or demand	54	51

4.1 Analysis and Results with the Existing Tool

As a result of the sentiment analysis in STEP 2, 20 and 18 sentences were detected as containing dissatisfaction, doubts, and demands in the section manager and department manager training, respectively. When the sentences were checked, all detected sentences contained dissatisfaction and demands for section and department managers. Therefore, the precision ratio was 100% for both. Moreover, 54 section managers and 51 department managers' comments contained dissatisfaction and demands, many of which were not detected by the existing tool, resulting in a recall ratio of 37.04% for section managers and 35.29% for department managers.

4.2 Analysis and Results Using the Politeness Method

In STEP 3, sentences containing the relevant parts of speech were analyzed using the politeness method; 65 sentences were detected in the section manager training, and 56 were detected in the department manager training. When the content of each sentence was checked, 47 and 46 sentences for section and department managers, respectively, were related to dissatisfaction and demands. Thus, the precision ratio was 72.31% for the section managers and 82.14% for the department managers. However, 54 of the section managers' sentences and 51 of the department managers' contained dissatisfaction or demands; thus, the recall ratios were 87.04% and 90.20% for the section manager and department manager, respectively, indicating that many dissatisfactions and demands were detected. Tables 10 and 11 show the correct responses to the comment statements of the section and department managers, respectively, for both methods.

Table 10. Detection results in section manager's low-satisfaction group comments

Category	Number	
All sentences	76	
Sentences that contain dissatisfaction or demand among them	54	
Sentences in which dissatisfaction or demand was detected by existing tool	20	
Sentences in which dissatisfaction or demand was detected correctly	20	Precision ratio: 100.00%
Sentences in which dissatisfaction or demand was included but not detected	34	Recall ratio: 37.04%
Sentences in which dissatisfaction or demand was detected by the new method	65	
Sentences in which dissatisfaction or demand was detected correctly	47	Precision ratio: 72.31%
Sentences in which dissatisfaction or demand was included but not detected	7	Recall ratio: 87.04%

Table 11. Detection results in department manager's low-satisfaction group comments

Category	Number	
All sentences	68	
Sentences that contain dissatisfaction or demand among them	51	
Sentences in which dissatisfaction or demand was detected by existing tool	18	
Sentences in which dissatisfaction or demand was detected correctly	18	Precision ratio: 100.00%
Sentences in which dissatisfaction or demand was included but not detected	33	Recall ratio: 35.29%
Sentences in which dissatisfaction or demand was detected by the new method	56	
Sentences in which dissatisfaction or demand was detected correctly	46	Precision ratio: 82.14%
Sentences in which dissatisfaction or demand was included but not detected	5	Recall ratio: 90.20%

4.3 Discussion of Results

Based on the above analysis, the existing sentiment analysis tool, Emorepo, had a high precision ratio but failed to detect many cases of dissatisfaction and demand, and the recall

ratio was only in the 30% range for both section and department managers. Tables 12 and 13 present the expressions detected by the existing tool in the section and department managers' comments, the classification by the tool, and whether they contain words classified as negative in the polarity dictionary created by Kobayashi et al. (2005) and Higashiyama et al. (2008) (When multiple occurrences of the same expression occur, they are combined into one). As shown in the table, nearly half of the words identified as negative in the polarity dictionary (7 out of 15 words for section managers and 5 out of 11 words for department managers) were included in the sections expressing dissatisfaction or doubt. Otherwise, phrases that are generally identified as negative are also found, such as "not enough opportunities," "not in time," "difficult," "less satisfactory," and "it was not half as attractive," among others. In conclusion, since the existing tool created a dictionary for detecting dissatisfaction based on general and extensive comment data collected in the past, it was inferred that the tool mainly detects words with negative polarity for dissatisfaction and typical words such as "I want," and "if you could give me" for demands.

Table 12. Expressions detected in the section manager's comments

Detected expressions	Classification by existing tool	Polarity
hurts	dissatisfaction	Negative
hard to grab	dissatisfaction	Negative
disappointing	dissatisfaction	Negative
tired	dissatisfaction	Negative
I had a hard time	dissatisfaction	Negative
it was a hindrance	dissatisfaction	Negative
too much work	dissatisfaction	Negative
heavy	dissatisfaction	
not enough opportunities	dissatisfaction	
I can't make it in time	dissatisfaction	
wanted to be there	dissatisfaction	
would have liked to	dissatisfaction	
I would have liked to see an increase	dissatisfaction	
in a hurry	dissatisfaction	
Isn't it?	doubt	
I want you to distribute the answers	demand	
I want you to handle it.	demand	
I wish you would have made more effort	demand	
would have changed	demand	

Table 13. Expressions detected in the department manager's comments

Detected expressions	Classification by existing tool	Polarity
disappointed	dissatisfaction	Negative
it is inevitable	dissatisfaction	Negative
there was a bias	dissatisfaction	Negative
I was in a rut	dissatisfaction	Negative
too difficult	dissatisfaction	
too many	dissatisfaction	
satisfaction level was low	dissatisfaction	
it was not half as attractive	dissatisfaction	
I wanted to interact	dissatisfaction	
wanted to experience	dissatisfaction	
I was left with questions	doubt	Negative
could be utilized a little more.	demand	
I'd be happy to have it.	demand	
I wish you could	demand	

Conversely, sentences detected by the politeness method and those not detected by the existing tool included the following:

"If the points to be discussed in the lecture were made known to the students at the same time that the case studies were distributed in advance, we would be able to prepare in advance, and the discussion in the lecture on that day would be livelier."

"The latest business situation (in this case, Digital Transformation) was very beneficial, so I think it would be good if the curriculum focused on this content."

These statements did not contain words that directly imply negative polarity. Instead, while using positive expressions such as "the discussion would be livelier" and "it was very beneficial," the respondents demanded improvements in prior learning instructions and curriculum content. This also appears to be a considerate expression aimed at minimizing blame. The politeness method can suggest that this is a sentence that should be checked for content because it detects the adverb "at the same time" and the adjective "lively," the adverb "very," the adjective "beneficial," and the adjective "good," without narrowing the polarity.

There are also the following examples:

"It might have been beneficial if I had taken the course when I was in management."

This sentence contains no words with negative polarity. However, "might have been" expresses dissatisfaction that "it was not beneficial to me at present" while using the principle

of politeness (minimization of blame to the other party) and using considerate expressions that mitigate and inhibit infringement. Because the politeness method includes the negative auxiliary verb of Japanese in the detection criteria, the use of "might have been" can be extracted as a sentence to be confirmed.

Respondents sometimes string multiple sentences to form a single opinion. The following examples are provided in this comment:

> "I learned a lot from the A sessions, but I feel like the B sessions were a bit of a rut. Perhaps, this was because it was a period of looking back."

This is interpreted as a follow-up to the first sentence of dissatisfaction, followed by a mitigating expression and avoidance of disagreement in the following sentence, "Although it may have been ..." to minimize blame to the other party. The politeness method overlooks the detection of dissatisfaction in the first sentence. Nonetheless, it can recover by detecting the negative auxiliary verb of "maybe" in the subsequent follow-up sentence.

Because the politeness method selects words based on their parts of speech alone, it cannot detect sentences that are neither dissatisfied nor demanding, making it difficult to achieve a 100% match rate. However, in this study, the target group was managers skilled in politeness strategies who tended to avoid direct dissatisfaction/demand expressions. The objective was to accurately extract dissatisfaction/demand expressions with few omissions from the data of a small number of low-satisfaction groups. Therefore, it was interpreted that polarity-independent checking based on the understanding of considerate expressions is more valuable than the existing method, which detects words that generally have a negative impression.

5. Dissatisfaction and Demand Expressions that Contribute to the Improvement of the Training Program

Thus far, the analysis has confirmed a method for efficiently retrieving information on dissatisfaction and demands from many survey comments. The next question was to clarify whether differences exist in the expression of opinions regarding the adoption of improvements for the training program among the various opinions. As confirmed in Section 3.8, the targets for improvement differ between low and medium/high satisfaction levels. The low-satisfaction group tended to express their opinions about disadvantages. In contrast, the medium- and high-satisfaction groups offered constructive suggestions to improve the training for all participants. Therefore, we asked section and department managers to identify words that appeared in the low-satisfaction group but never in the medium/high-satisfaction group, or, if they did appear, they did not demand expressions of dissatisfaction. Table 14 presents the results.

Table 14. Words that appear only in the low-satisfaction group

Keyword	Part of speech	Section mgr.	Department mgr.
heavy	Adjective	○	
low	Adjective	○	
painful	Adjective	○	
enormous	Adjective verb	○	
happy	Adjective		○
bad	Adjective		○
similar	Adjective verb		○
useless	Adjective verb		○
frank	Adjective verb		○
at the same time	Adverb		○
to a great extent	Adverb		○
not so much	Adverb		○

First, the words that appeared in the section and department manager groups differed. The words that appeared only in the low-satisfaction group of section managers were “heavy,” “low,” “painful,” and “enormous.” All four words expressed a relatively straightforward negative state. This reinforces the hypothesis that even in the position of section manager, when expressing dissatisfaction straightforwardly, they often want to assert the disadvantages they have suffered as an individual.

Department managers varied in their vocabulary even when expressing strong dissatisfaction, with some expressing straightforward dissatisfaction, such as “bad” and “useless.” At the same time, others used the paradoxical “happy” or the less impressive “not so much,” and “to a great extent.” Although we confirmed the differences in how the words were expressed by the section managers, we could not identify a rule of thumb at this stage.

Considering the above, discovering a method to determine whether an opinion should not be adopted as an improvement plan, even if the user is strongly dissatisfied with the expression of words, remains an issue for future research.

6. Conclusion

This study leveraged the politeness method and text mining tools to efficiently extract valuable information from participant questionnaires. The findings demonstrate that these tools offer significant improvements in information retrieval, enabling timely adjustments and enhancements to training programs for working adults. By conducting satisfaction

surveys after each lecture, practitioners can promptly identify areas for improvement, thereby enhancing the effectiveness of training initiatives in the business world.

To date, people have had to visually inspect the text data of many participant questionnaires after training to extract the necessary information. However, using the newly discovered and confirmed knowledge, politeness method, and text mining tools in this study, it was found that improvements can be made efficiently. A satisfaction survey was conducted after all 12 lectures over a three-month period. However, because this method enables efficient information retrieval, extracting information for quick improvement from the post-lecture questionnaires for each lecture is easy. This process may facilitate the timely improvement of training programs for working people and is expected to be useful in the business world.

Meanwhile, the expressions used in the responses differed depending on the section manager or department manager's position, even among working adults. However, as this study targeted only two levels of managers, there are limitations in elucidating the overall phenomenon. In the future, it is expected that expanding the survey scope to include general employees and executives and studying the differences in demand expressions depending on their positions, will contribute to improving effective opinion elicitation. In addition, the language used by people has changed over time. Therefore, it is necessary to improve the criteria for extracting demand expressions from training programs for working adults.

References

Brown, P., & Levinson, S. (1987). *Politeness: Some universals in language usage.* Cambridge University Press. https://doi.org/10.1017/CBO9780511813085

Gratton, L., & Scott, A. J. (2016). *The 100-year life: Living and working in the age of longevity*. London: Bloomsbury Publishing.

Gruber, T., Fuß, S., Voss, R., & Gläser-Zikuda, M. (2010). Examining student satisfaction with higher education services: Using a new measurement tool. *International Journal of Public Sector Management, 23*(2), 105-123. https://doi.org/10.1108/09513551011022474

Hayashi, K., & Tsuda, K. (2022). Discovering novel methods of improving middle management training through text mining. *Procedia Computer Science, 207*, 1490-1499. https://doi.org/10.1016/j.procs.2022.09.206

Heskett, J. L., Jones, T. O., Loveman, G. W., Sasser, W. E. J., & Schlesinger, L. A. (1994). Putting the service-profit chain to work. *Harvard Business Review, 72*(2), 164-174.

Higashiyama, M., Inui, K., & Matsumoto, Y. (2008). Learning sentiment of nouns from selectional preferences of verbs and adjectives. *Proceedings of the 14th Annual Meeting of the Association for Natural Language Processing* (pp. 584-587). Retrieved from https://www.anlp.jp/proceedings/annual_meeting/2008/pdf_dir/PA2-2.pdf

Higuchi, K. (2014). *Quantitative text analysis for social researchers: A contribution to content analysis.* Kyoto: Nakanishiya-Shuppan. Co., Ltd.

Inoue, M. (2006). *Chapter 4: Modality, dialect grammar, dialectology series 2* (pp. 137-178).

Tokyo: Iwanami Shoten, Publishers.

Kanayama, H., & Nasukawa, T. (2005). Extraction and organization of demand expressions. *11th Annual Conference Proceedings of the Association for Natural Language Processing* (pp. 660-663). Retrieved from https://www.anlp.jp/proceedings/annual_meeting/2005/pdf_dir/S3-4.pdf

Kobayashi, N., Inui, K., Matsumoto, Y., Tateishi, K., & Fukushima, T. (2005). Collection of evaluation expressions for opinion extraction. *Journal of Natural Language Processing, 12*(3), 203-222. https://doi.org/10.5715/jnlp.12.3_203

Kolb, A. Y., & Kolb, D. A. (2005). Learning styles and learning spaces: Enhancing experiential learning in higher education. *Academy of Management Learning & Education, 4*(2), 193-212. https://doi.org/10.5465/AMLE.2005.17268566

Leech, G. N. (1983). *Principles of pragmatics.* London: Routledge. https://doi.org/10.4324/9781315835976

Liu, B. (2012). *Sentiment analysis and opinion mining*. Springer Cham. https://doi.org/10.1007/978-3-031-02145-9

Nakahara, J. (2021). *Management learning: The Science of Human Resource Development.* Tokyo: The University of Tokyo Press.

Nicol, D. (2010). From monologue to dialogue: Improving written feedback processes in mass higher education. *Assessment & Evaluation in Higher Education, 35*(5), 501-517. https://doi.org/10.1080/02602931003786559

Okada, M., Takeuchi, K., & Hashimoto, K. (2015). An investigation of effectiveness of estimation string pattern to extract sentiment information from customer reviews of tourists. *Proceedings of the 29th Annual Conference of the Japanese Society for Artificial Intelligence* (pp. 1-3). https://doi.org/10.11517/pjsai.JSAI2015.0_1B23

Oliver, R. L. (2010). *Satisfaction: A behavioral perspective on the consumer* (2nd ed.). New York: Routledge. https://doi.org/10.4324/9781315700892

Taketani, K., & Watari, H. (2015). Analysis of course evaluation for improving on-demand academic writing class: Text mining approach from the perspective of customer satisfaction analysis. *Kyoto University Researches in Higher Education, 21*, 1-14. Retrieved from http://hdl.handle.net/2433/210139

Tseng, C., Chou, J., & Tsai, Y. (2018). Text mining analysis of teaching evaluation questionnaires for the selection of outstanding teaching faculty members. *IEEE Access, 6*, 72870-72879. https://doi.org/10.1109/ACCESS.2018.2878478

Yamaoka, M. (2018). Classification of Japanese considerate expressions and vocabulary list (Part I. Research on considerate expressions). *Nihongo Communication Kenkyu Ronshu, 7*, 3-11.

Yamaoka, M., Makihara, T., & Ono, M. (2010). *Communication and considerate*

expressions-Introduction to Japanese linguistics. Tokyo: Meiji Shoin.

Yi, J., Nasukawa, T., Bunescu, R., & Niblack, W. (2003). *Sentiment analyzer: Extracting sentiments about a given topic using natural language processing techniques* (pp. 427-434). Third IEEE International Conference on Data Mining, Melbourne, FL, USA. https://doi.org/10.1109/ICDM.2003.1250949

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