Fit Satisfaction of Formal Jackets in Apparel Product Websites - Focus on Plus-sized Women in Their 20s' and 30' -

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Abstract

For fit satisfaction evaluation, the subjects were asked to put on the jackets from the seven manufacturers in random order, view how the jackets fit in a full-body mirror and answer questions regarding fitting in 22 specific areas, including the neck, shoulders, waist, hips and arms, as well as eight questions related to maneuverability. The surveys and evaluations were conducted between October 2007 and November 2008, and the compiled data were analyzed using the SPSS 14.0 statistics program. The One-way analysis of variance was performed to comparatively analyze the differences among the products from the seven manufacturers. Post-hoc tests were performed based on Duncan's test for the criteria that displayed significant differences. The results were summarized as follows. Fit evaluations were performed for the size 88 formal jackets from the seven manufacturers. All items, except the center front line, displayed significant differences at $p<0.05$ or higher among the manufacturers. The age group 20-39 felt that the main problems were in the shoulder, armscye, upper arm, waist, abdomen and hip areas. Modifying the shoulder area, armscye depth and hip areas severely compromises the jacket's balance, and attention to these areas must be given developed pattern design.

Key words : fit satisfaction, plus-sized women, formal jacket, apparel product websites.

Ⅰ. Preface

Internet shopping mall is a place where information on merchandises are provided in a virtual space of internet and the merchandises are delivered to the places the customers want after the customers log in with computers, view the information and choose and pay for the merchandises- where sales of merchandises and services take place.[1] Domestic internet shopping mall market is growing rapidly starting with Interpark in 1996 and grown by nearly 1,000 times after a decade.[2] Annual internet shopping mall revenues in 2007 were 15 trillion and 765.6 billion KRW and the breakdown by merchandise groups show apparel/fashion and related merchandises (17.2%), travel and reservation service (15.3%), appliances/electronics/communication devices (14.8%) and computers and peripherals (14.8%)[3] which shows apparel/fashion and related

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1) Seung-Il Choi, "A Study on Effects of Characteristics of Internet Shopping Mall on Customer Loyalty," *The Journal of the Korea Contents Association* Vol.5 No.4 (2005), pp.45-53.

2) Kwang-Hee Han, "Characteristics of Internet Shopping Malls in Korea and Their Improvement," *The Journal of the Korea Contents Association* Vol.7 No.3 (2007), pp.187-196.

3) Korea National Statistical Office, "Statistical Research of Cyber Shopping Mall in December 2007," Information Retrieval Date 2008. 3. 23, http://kostat.go.kr/nso

merchandises are solidifying their position as the main trade category in the internet shopping malls. Customers with an experience purchasing merchandises through internet have increased steadily since 2000, 67.7% in 2002 and 77.6% in 2004. Females purchased more than males and the age group of 20-34 showed relatively higher internet purchase experiences.[4] The trend is that more younger generations in 20's and 30's prefer internet fashion shopping[5] as they can select products that suit their tastes in various information and merchandises can be purchased at lower prices with out middlemen. Internet shopping mall is rising to the status of a new player in the distribution market past the conventional notion of being alternative or niche market of conventional offline retail distributors such as department stores and warehouse stores.[6] Such rapid growth of the internet shopping malls brought positive effects to distribution industry and fashion industry in large but also possesses many problems at the same time.

Apparel merchandises overall are experiential goods requiring much investigation and though the return ratioof merchandises purchased online varies by types of products but general return ratio reached about 5-20% and the return ratio of fashion related products reached 19.5% with the size factor being the largest for the apparel merchandises.[7] In addition, visual judgment is difficult due to different standards and sizing system by brands and the limitation of incapability to represent materials and colors identical to actual products.[8] Customers in 20's and 30's with an apparel merchandise purchase experience avoid purchasing apparel merchandises due to product selection, material, distrust in size and issues in exchange and return.[9] These dissatisfaction factors affect the customer satisfaction level and affect the customer loyalty and repurchase intention. The reasons why customer loyalty and repurchase intention are important are because the most of internet shopping mall profits come from long term customers and the importance of the defensive strategy of focusing on increasing customer loyalty and maintaining previous customers is increasing rather than the offensive strategy of recruiting new customers and expanding market share.[10]

More efforts are required for efficient customer service in internet shopping malls than conventional brick and mortar shopping malls. However, because of the uniqueness of the fashion field requiring application of various factors as physique, atmosphere, efficiency and appropriateness, the shortcoming exists that traditional shopping transactions cannot be replaced in which personal feel and taste are considered by actually dressing customers with their physique considered and the reality is that developments of a system to replace it are also insufficient.[11] In addition, fit or appearance can be observed by fitting stage for women's or men's formal apparel in which the fit is more

4) Jun-Gu Jeon, "2004 KNP (Korean Netizen Profile) Report," *Korea Federation of Advertising Associations* (2004), pp.1-76.

5) Do-yle Kim, Seung-Hee Lee and Jong-Hee Park, "A Study on Purchase Internet of Fashion Products and Affecting Factors in the Internet Shopping Malls," *Market Research* Vol.8 No.1 (2003), pp.69-89.

6) Jung-Hoon Bae and Jea-Ok Park, "Purchase Motives of Fashion Products in Surrogate Internet Shopping Malls," *Journal of the Korean Society of Clothing and Textiles* Vol.31 No.3 (2007), pp.486-494.

7) Hye-Kyung Ji, "The Characteristics of Return Factor, Information Search and Perceived Risks by Return Experience in Internet Clothing Purchase," *Journal of the Korean Fashion & Costume Design Association* Vol. 10 No.3 (2008), pp.149-161.

8) Tae-Youn Kim and Yoon-Jung Lee, "The Effect of Trial-Experience Information on the Traffic and Sales Performance of Apparel Product Websites," *Journal of the Korean Society of Clothing and Textiles* Vol. 29 No.11 (2005), pp.1369-1380.

9) Yeong-Joo Cho, Sook-Ja Lim and Seung-Hee Lee, "Apparel Purchase Behavior among Internet Shoppers: Focusing on Perceived Risks," *Journal of the Korean Society of Clothing and Textiles* Vol.25 No.7 (2001), pp.1247-1257.

10) Ho-Kyung Shin, Jung-Han Hong and Kyung-Kyu Kim, "The Influence of Website Characteristics on Customer Satisfaction, Customer Loyalty, and Repurchase Intention in Internet Shopping Malls," *The Journal of Society for e-Business Studies* Vol.12 No.1 (2007), pp.41-71. 재인용.

important but it is difficult with the current technology to reduce the risk by fitting in internet.[12] To decrease there turn ratios in internet apparel shopping malls due to size dissatisfactions of apparel products, it is believed that physique characteristics of target groups using internet shopping malls need to be identified first, the dissatisfactions in fit need to be identified in detail through the eyes of consumers and product developments need to reflect these.

Therefore, it is attempted in this study to identify dissatisfactions related to the sizes and fits before and after online jacket purchases using survey method to plus-sized female consumers in 20's and 30's that showed relatively higher ratio of internet purchases in prior researches. In addition, the goal is to provide basic data to assist in development of formal jacket patterns with excellent physical fitness that reflect physical characteristics of plus-sized female consumers in 20's and 30's by investigating the fit satisfaction level of formal jacket products being sold in online shopping malls for plus-sized female consumers in 20's and 30's after collecting the standard 88 size formal jacket products being sold in online shopping malls for plus-sized women and conducting fit assessment of each company product.

Ⅱ. Research Method and Procedure

1. Research Method

Qualitative studies and quantitative studies are performed simultaneously in this research. In the qualitative study, respondents were allowed to respond freely in their point of view without limits of thoughts using survey method in order to identify dissatisfactions related to sizes and fits before and after the purchase when plus-sized female consumers in 20's and 30's purchase jacket products online. In the quantitative study, appearance assessment and motion fitness assessment were conducted within the range recognizable by the subjects representing consumers in order to assess fit satisfaction level of formal jacket products being sold in online shopping malls.

2. Selection of Subjects

Total of 48 female consumers in 20's and 30's residing in Seoul or Kyunggi-do with 1.5 or higher Rohrer index with one or more jacket product purchase experiences from online stores were convenience sampled and were asked to state dissatisfactions related to sizes and fits before and after the purchase. Female subjects in 20's and 30's were selected among them to assess fit satisfaction of formal jacket products being sold in online shopping malls. Rohrer index was 1.5 or higher and the required criteria were the bust of 90cm or above and below 100cm as size 88 formal jacket products provide the bust of 100 cm[13] and the drop (difference between hip and bust) distribution of 3cm to 21cm corresponding to N physique and A physique according to the KS K 0051 physique categorization table in order to represent plus-sized consumers by age and physique. Six females in 20's and six females in 30's, total twelve subjects were selected that satisfy all of the criteria and the 〈Table 1〉 shows the mean physical measurements of the subjects.

3. Formal Jacket Products for Fit Satisfaction Assessment

Results of investigating and analyzing prior researches to select formal jacket products for the fit satisfaction assessment of formal jackets

11) Myung-Ja Tak and Chee-yong Kim, "A Study on Virtual Fitting Model System for Internet Fashion Shopping Mall," *Journal of Korea Multimedia Society* Vol.9 No.9 (2006), pp.1184-1195.

12) Hyun-Jung Kim, Eun-young Lee, and Jae-Ok Park, "Consumers' Purchasing Process of Fashion Products on the Internet: A Qualitative Approach," *Journal of the Korean Society of Clothing and Textiles* Vol.24 No. 6 (2000), pp.907-917.

13) Hee-Jung Ha, "Sizing System of Plus-sized Women's Formal Jackets in On-line Shopping Malls," *2008 International Costume Culture Conference* (2008), pp.30-32.

〈Table 1〉 Mean Physical Measurements of Subjects (Unit: cm)

Measurement / Detailed Category	Mean	S.D.
Height	160.467	4.848
Front Interscye Length	32.917	1.026
Back Interscye Length	35.592	0.834
Bust Point-bust Point	19.925	1.430
Chest Circumference	93.342	3.065
Bust Circumference	98.625	2.861
Waist Circumference	81.250	2.291
Abdomen Circumference	93.908	3.837
Hip Circumference	103.325	2.974
Thigh Circumference	64.625	1.823
Upper Arm Circumference	31.942	0.765
Wrist Circumference	16.842	0.438
Biacromion Length	40.225	0.554
Waist Back Length	39.708	0.448
Cervical to Waist Length	53.842	0.533
Cervical to Breast Point Length	37.375	0.496
Upper arm Length	30.492	1.831
Arm Length	54.483	1.897
Weight (kg)	68.958	4.585
Röhrer Index	1.669	0.154

of plus-sized consumers in 20's and 30's show the following. S. Kim (2005)[14] analyzed top 240 apparel product styles by revenues into product categories and stated that standardized basic style products that are relatively easy to judge fit overall accounted for 74.2% and general brands topped designer brands or name brands at 69.2% for top sales product brand types and the price composition of top sales products showed that many product purchases are being made at under 100 thousand KRW range for jackets with 10-50 thousand KRW at 66.5% and 50-100 thousand KRW at 16.7%. In addition, D. Chung (2003)[15] stated that semi-fit style princess line, jacket length of 20-30cm below waist line and jackets with tailored collars are preferred by both sellers and consumers. M. Kim (2007)[16] stated that black was in large the most preferred color and wool blend fabric was most preferred material in Spring and Autumn.

Therefore, general brand one-button wool-blend formal jackets under 100 thousand KRW price range from online store with semi-fit style princess line, tailored collar, jacket length of 20-30cm below waist line and same design category were selected. Products analyzed in the research by H. Ha[17] which satisfied all of the criteria were selected, assessed and analyzed. Size information and actual measurements of the products are shown[18] in 〈Table 2〉.

4. Fit Satisfaction Assessment Method and Data Analysis

Fit satisfaction assessment was conducted by dressing the subjects with products from seven companies in a random order. Each subject was asked to assess twenty-two categories related to appearance assessment such as baseline, ease, princess line placement and wrinkles with in the recognizable range of the subject corresponding to consumers, after showing them their dressed condition (front, side, back) in a full-body mirror. Motion fitness assessment was conducted by having them pose eight postures and assess the fitness of each category. After referring to prior resear-

14) Seon-Sook Kim, "The Research about Successful Apparel Products in Internet Shopping-mall: Focusing on F/W Products," *Journal of the Korean Society of Clothing and Textiles* Vol.29 No.9/10 (2005), pp.1349-1358.

15) Dong-Lim Chung and Aea-Rin Kim, "Jacket Pattern for Plus-sized Women and Visual Effects of Area Division," *Proceedings of the Korea Society of Costume Conference* (2003), p.34.

16) Myung-Ok Kim and Mi-A Suh, "A Survey on the Ease of Jacket and Lining Fabrics that made of Stretchable Fabrics," *The Research Journal of the Costume Culture* Vol.15 No.2 (2007), pp.265-275.

17) Hee-Jung Ha, op. cit., (2008), pp.30-32.

18) Ibid., pp.30-32.

〈Table 2〉 Size Information and Actual Measurements of Size 88 Formal Jacket Products by Companies

Categories \ Companies		A	G	I	N	Q	R	S
Biacromion Length	Size Information	42	37	40	39	39	37	39
	Actual Measurement	39	37	37.5	41	38	37	37
Bust Circumference	Size Information	100	100	98	100	100	100	100
	Actual Measurement	98	98	96	99	96	96	95
Waist Circumference	Size Information	-	-	-	-	-	-	-
	Actual Measurement	89	92	90	91.5	91.5	89.5	92.5
Hip Circumference	Size Information	-	-	-	-	-	-	-
	Actual Measurement	112	113	112.3	111.5	110	111	110
Sleeve Circumference	Size Information	36	36	36	36	36	36	36
	Actual Measurement	37	35	37	35	36	36.5	36.5
Sleeve Length	Size Information	-	62	62	-	61	60	-
	Actual Measurement	62	61	62	60.5	60	61.5	61.5
Jacket Length	Size Information	65	67	64	63	66	63	63
	Actual Measurement	63(59.5)	67(61)	67(62)	69(63)	69(65)	64(59.5)	66(59)

Notes 1. Empty cells are for size information not provided by the companies.
2. Bust size is measured at an arbitrary horizontal line under the armpit point of products.
3. Waist size is measured at an arbitrary horizontal line 39cm below back neck point.
4. Hip size is measured at an arbitrary horizontal line 59cm below back neck point.
5. Actual measurements of jacket lengths are recorded as "front-center length (back-center length)" due to discrepancies between front and back.

ches,[19-21] the assessment standard and categories were selected after discussions and three preliminary experiments to achieve objective assessment. The contents are shown in 〈Table 3〉 and 〈Table 4〉.

Each category was asked to be assessed as 1 point for "absolutely not", 2 point for "no", 3 point for "slightly not", 4 point for "average", 5 point for "slightly yes", 6 point for "yes" and 7 point for "absolutely yes." Motion fitness categories were asked to be assessed according to Likert type 7 point scale following the degree of discomfort and comfort with 1 point for "very uncomfortable", 2 point for "uncomfortable", 3 point for "slightly uncomfortable", 4 point for "average", 5 point for "slightly comfortable", 6 point for "comfortable" and 7 point for "very comfortable."

Research and fit assessment were conducted from October 2007 to December 2008 and the collected data were analyzed with SPSS 14.0 statistical program. Dissatisfactions categories before and after product purchaseswere studied with frequency analysis. Appearance assessment and motion fitness assessment analysis were conducted with group mean analysis and one-way ANOVA

19) In-Mi Kim and So-Ra Kim, "A Study of Ready-Made Clothes (RMC) of Women in Their Early Twenties: Their Body Posture and RMC Fitting," *Korean Journal of Human Ecology* Vol.18 No.2 (2009), pp.451-463.

20) Dong-Lim Chung and Aea-Rin Kim, op. cit., (2003), p.34.

21) Hwa-Yeon Jeong and Mi-A Suh, "A Study on the Fit of Ready-to-Wear Garment for Girls at the Age of Puberty," *The International Journal of Costume Culture* Vol.9 No.1 (2006), pp.39-51.

〈Table 3〉 Contents of Appearance Assessment Categories for Formal Jacket Products

Classification	No.	Contents of Assessment Categories
Baseline	1	Is the front-center line laid correctly?
	2	Does the neck area fit naturally?
	3	Is the biacromion length appropriate?
	4	Is the armhole line placed at its proper location?
	5	Does the side seam divide the front and the back with balance?
Ease	6	Is the ease in bust appropriate?
	7	Is the ease in waist appropriate?
	8	Is the ease in abdomen circumference appropriate?
	9	Is the ease in hip appropriate?
	10	Is the ease in upper arm appropriate?
	11	Is the cut in the armhole depth appropriate?
Length	12	Is the sleeve length appropriate?
	13	Is the jacket length appropriate?
Wrinkles	14	Is there wrinkle in the neck area?
	15	Is there wrinkle in the shoulder area?
	16	Is there wrinkle in the armpit area?
Line	17	Is the placement of the front princess line appropriate?
	18	Is the placement of the back princess line appropriate?
Overall	19	Are the front ease and the silhouette appropriate?
	20	Are the side ease and the silhouette appropriate?
	21	Are the back ease and the silhouette appropriate?
	22	Is the overall fit good?

〈Table 4〉 Motion Fitness Assesment Categories for Formal Jacket Product

No.	Contents of Assessment Categories
1	Upright standing posture
2	Posture with upper limbs moving back and forth while walking
3	Both arms 90° up frontward posture
4	Both arms 90° up sideways posture
5	Posture with right arm raised as much as possible
6	Both arms crossed in front posture
7	Bent forward 90° standing up posture
8	Sitting on chair 90° posture

was conducted to compare and contrast products from different companies. Duncan's test was performed as post-hoc tests for the categories where significant differences were recognized.

Ⅲ. Research Results

1. Dissatisfactions on Sizes and Fits in Online Company Jacket Purchases

It is asked "Have you had any inconvenient experiences related to size or fit when trying to purchase jacket products online? If so, please write it down in detail" to study problems prior to purchasing products and it is summarized below.

<Statement Examples>

"It is difficult to find out if the clothes fit my physique just by looking at the garment size labeling."

"It is difficult to find the size that fits me."

"I have relatively large hip size and I can't find out if the clothes fit me because only the bust size provided."

"It reads sleeve circumference, sleeve size or arm circumference and you can't tell what part of the arm."

"It is frustrating because you can't tell if the provided sizes are the physical measurement or the product size."

"It reads sleeve length or arm length and you can't tell if it's physical measurement or product size."

"I have relatively thick arm and it is difficult to guess if it's going to be comfortable just by looking at the provided sleeve circumference."

"I'm fat but I like to wear a little tight rather than just hide the physique. However, I can't tell how it's going to fit with no waist or hip size information."

"It is difficult to guess the fit with a few provided sizes. I return it if it doesn't fit."

"I can't tell how long it is or how it is going to fit when you wear it just by looking at the provided size."

As seen above, stated problems relating to size and fit mainly listed as dissatisfaction while purchasing jacket products were problems with symbolic size marking, confusions from mixed use of size terms, absence of detailed size information and not having various sizes available. This coincides with the research conclusion[22] which stated that the function of the size information which should be used as the basis to selecting clothes that fit the consumers' physiques was not performing correctly. In addition, it also coincides with the research conclusion[23] which stated that confusions are mounting in consumers' point of view as most companies use the terms mixed even though sleeve circumference and sleeve length signify the product size and arm circumference and arm length signify the physical measurement. If size notations according to the standardization of apparel product sizes as "bust-hip-height" showing basic body parts are commercialized, reference physical measurements are provided in addition to basic physical measurements and standardized terms are used, it is believed that more accurate and preferable decision making can be assisted in selecting products in online environments without trying them on.

It is asked "Have you had any inconvenient experiences related to size or fit after purchasing jacket products online? If so, please write it down in detail" to study problems after purchasing products and it is summarized below.

<Statement Examples>

"There is no snuggly fit around neck area and it lifts in the front."

"I made the purchase after reading the provided size information but ended up returning it because the shoulder and armhole width were small."

"Armhole area is small. I think it would have been better if it were a little larger."

"There is slack in the armhole. I would like it to fit appropriately and make arms skinnier."

"Front interseye length is a little big."

"Waist and abdomen area are not pretty. It also seems like there is too much slack."

"Waist is big and hip is small."

"Maybe it's because my hip sticks out but hip ease in the back feels too small."

"The sleeves are too long and the width is small. I would like a little more slack."

"The jacket length is a little short. I would like it to cover the large hip and thigh slightly."

"I don't like the collar and the lapel. They are too wide."

As seen above, stated problems relating to size and fit mainly listed as dissatisfaction after

22) Hee-jung Ha, "An Analysis of Present Condition of Sizing System and Fitting on Formal Pants of the On-line Shopping Mall for Plus-sized Women," *Journal of the Korean Society of Costume* Vol.58 No.1 (2008), pp.133-150.

23) Hee-Jung Ha, op. cit., (2008), pp.30-32.

purchasing jacket products were shoulder and armhole area, eases in waist and hip and sleeves and jacket lengths. This coincides with the research conclusion[24] which stated that overweight females in the 20's preferred clothes showing the body silhouette with small slack when selecting clothes and not styles hiding the body with much slack. It also coincides with the research conclusion[25] which stated that returns would occur due to size discrepancies and also with the research conclusion[26] which stated that more than 50% of plus-sized females under 35 years of age experienced alteration when purchasing ready-made clothes as plus-sizes were limited to middle age and domestic female adult ready-made clothes companies focused on designs for younger people. Returns after purchases due to size discrepancies can be reduced by providing product sizes in standardized terms and error tolerance ranges in order to give consumers confidence in size information. Ultimately, it is believed that fit satisfaction of the products will increase if product design reflecting physical characteristics of plus-sized females under 35 years of age is conducted.

2. Appearance Assessment of Plus-size Women's Formal Jacket Products by Online Companies

Subjects in their 20's and 30's were dressed size 88 formal jacket products collected from seven companies and appearance assessment was conducted. The result is shown in 〈Table 5〉. All categories except front-center line category showed significance differences among companies above $p<0.05$ level.

Detailed view of the categories with significant differences show that in biacromion length, company A received a relatively higher assessment of 4.00 than other companies, company G received the lowest assessment of 2.66 and all other companies received relatively low assessments of 3.08-3.83. Comparing shoulder widths by companies considering biacromion length of 40.22cm from the 〈Table 1〉, the mean physical measurements of the twelve subjects, the range of ease was from −1.22cm to −3.22cm with the actual shoulder width measurement of 39cm (−1.22 cm) for company A which received relatively high assessment and 37cm (−3.22cm) for company G which received low assessment. This coincides with the research results stating that because plus-size women in their 20's and 30's have larger shoulder width compared to other age groups[27] they prefer slight ease in shoulder width.[28] It is believed that most companies do not reflect the physical characteristics in the age groups of 20's and 30's.

In armhole line category, company G, N and R received relatively high assessments of 4.16-4.58 and company I received low assessment of 3.25. In side seam line category, company A, I, Q and R received relatively higher assessments of 4.75-5.25 than other companies and company G, N and S received low assessments of 3.66-4.00.

In bust category, company I, Q and R received relatively high assessments of 4.50-4.91 and company G received the lowest assessment of 2.75. In waist category, company A, I, Q and R received assessments of 3.75-4.25 and company G, N and S received low assessments of 2.66-3.08. In abdomen circumference category, company A, I and Q received assessments of 3.50-3.83 and company G received the lowest assessment of 2.41. In hip category, all companies except company G received assessments of 3.58-4.16 and company G received low assessment of 2.66.

24) Hye-Jung Seok and In-Suk Kim, "A Study on the Fit Preference Tendency for Ready-to-wear by the Age and Obesity Level of Adult Women," *Journal of the Korea Home Economics Association* Vol.41 No.9 (2003), pp.17-29.

25) Hee-Jung Ha, op. cit., (2008), pp.30-32.

26) Ok-jin Sung and Hee-jung Ha, "A Study of Lower Body Shapes of Plus-sized Women to Index," *The Journal of the Costume Culture* Vol.56 No.2 (2005), pp.101-111. 재인용.

27) Ibid., pp.101-111.

28) Hye-Jung Seok and In-Suk Kim, op. cit., (2003), pp.17-29.

〈Table 5〉 Appearance Assessment from Age Groups of 20's and 30's of Formal Jacket Products by Companies

Categories \ Companies		A 1	G 2	I 3	N 4	Q 5	R 6	S 7	F-value
		M(SD)	M(SD)	M(SD)	M(SD)	M(SD)	M(SD)	M(SD)	
Baseline	Front-center Line	5.91 (1.16)	5.83 (1.26)	6.33 (0.98)	5.58 (0.90)	6.00 (1.04)	6.16 (1.02)	6.08 (0.99)	0.627
	Neck Area Line	5.16 (1.02)^{a}	4.83 (1.11)^{a}	4.41 (0.90)^{ab}	3.75 (0.96)^{b}	5.08 (0.90)^{a}	4.66 (1.32)^{a}	4.91 (0.79)^{a}	2.754*
	Biacromion Length	4.00 (1.04)^{a}	2.66 (0.65)^{c}	3.25 (0.96)^{abc}	3.83 (0.83)^{ab}	3.41 (0.90)^{abc}	3.58 (0.79)^{ab}	3.08 (0.90)^{bc}	3.224**
	Armhole Line	3.66 (0.49)^{bc}	4.58 (0.79)^{a}	3.25 (0.62)^{c}	4.16 (0.83)^{ab}	3.33 (0.65)^{c}	4.33 (1.07)^{ab}	3.75 (0.75)^{bc}	5.259***
	Side Seam Line	5.00 (0.85)^{a}	3.91 (1.16)^{b}	5.08 (0.99)^{a}	4.00 (0.85)^{b}	5.25 (0.75)^{a}	4.75 (0.86)^{a}	3.66 (0.49)^{b}	7.253***
Ease	Chest Circumference	3.50 (0.67)^{b}	2.75 (0.75)^{c}	4.58 (0.66)^{a}	2.91 (0.79)^{bc}	4.50 (0.67)^{a}	4.91 (0.90)^{a}	3.25 (0.96)^{bc}	15.061***
	Waist Circumference	3.91 (0.90)^{a}	3.00 (0.95)^{b}	4.00 (0.85)^{a}	3.08 (0.51)^{b}	4.25 (1.05)^{a}	3.75 (0.75)^{a}	2.66 (0.49)^{b}	6.531***
	Abdomen Circumference	3.66 (0.49)^{a}	2.41 (0.79)^{c}	3.50 (0.52)^{a}	3.41 (0.51)^{ab}	3.83 (0.83)^{a}	3.33 (0.65)^{ab}	2.91 (0.66)^{bc}	6.587***
	Hip Circumference	3.58 (0.90)^{a}	2.66 (1.07)^{b}	3.66 (0.77)^{a}	3.83 (0.93)^{a}	4.16 (0.83)^{a}	4.00 (0.85)^{a}	3.91 (0.90)^{a}	3.584**
	Upper Arm Circumference	4.33 (0.65)^{ab}	2.83 (0.71)^{c}	4.66 (0.65)^{a}	3.08 (0.66)^{dc}	4.25 (0.96)^{ab}	3.50 (0.67)^{cd}	3.91 (0.79)^{bc}	10.209***
	Cut in Armscye Depth	3.91 (0.90)^{abc}	4.41 (0.51)^{a}	3.33 (0.77)^{c}	3.50 (0.79)^{bc}	4.08 (0.66)^{ab}	4.58 (0.99)^{a}	4.50 (0.79)^{a}	4.640***
Length	Sleeve Length	3.25 (0.45)^{cd}	4.41 (0.51)^{a}	3.33 (0.49)^{abc}	3.08 (0.79)^{d}	4.50 (0.52)^{a}	3.75 (0.45)^{b}	3.58 (0.51)^{bc}	12.680***
	Jacket Length	3.16 (0.83)^{c}	5.25 (0.75)^{ab}	4.66 (0.49)^{b}	5.00 (0.73)^{b}	5.83 (0.71)^{a}	2.91 (0.90)^{c}	3.33 (0.88)^{c}	26.913***
Wrinkles	Neck Area	4.66 (0.49)^{a}	4.58 (0.66)^{a}	3.75 (0.45)^{bc}	4.75 (0.62)^{a}	3.41 (0.66)^{c}	4.00 (0.95)^{b}	4.16 (0.71)^{ab}	6.769***
	Shoulder Area	3.08 (0.66)^{b}	2.66 (0.65)^{b}	3.25 (0.75)^{b}	4.91 (0.90)^{a}	3.16 (0.57)^{b}	2.91 (0.66)^{b}	3.00 (0.73)^{b}	12.989***
	Armpit Area	3.66 (0.49)^{bc}	4.41 (0.51)^{a}	3.25 (0.62)^{c}	3.58 (0.66)^{bc}	3.33 (0.65)^{bc}	3.83 (0.71)^{b}	4.50 (0.67)^{a}	7.455***
Line	Front Princess Line	2.83 (0.57)^{cd}	2.33 (0.49)^{d}	3.91 (0.79)^{a}	2.50 (0.52)^{cd}	3.41 (0.79)^{ab}	3.00 (0.60)^{bc}	2.75 (0.62)^{cd}	8.773***
	Back Princess Line	3.83 (0.57)^{a}	3.08 (0.90)^{b}	4.25 (0.75)^{a}	3.66 (0.65)^{ab}	4.08 (0.66)^{a}	3.75 (0.62)^{a}	3.58 (0.90)^{ab}	3.138**
Overall	Front Side Fit & Silhouette	3.25 (0.62)^{b}	2.58 (0.90)^{c}	3.50 (0.52)^{b}	3.75 (0.86)^{b}	4.50 (0.52)^{a}	3.66 (0.49)^{b}	3.50 (0.67)^{b}	8.709***
	Side Fit & Silhouette	4.00 (0.85)^{b}	2.91 (1.16)^{d}	3.83 (0.93)^{b}	3.00 (0.85)^{cd}	4.91 (0.99)^{a}	3.75 (0.86)^{bc}	3.66 (0.49)^{abc}	6.638***
	Back Fit & Silhouette	3.58 (0.51)^{c}	3.33 (0.65)^{cd}	3.41 (0.66)^{cd}	2.91 (0.79)^{d}	5.00 (0.95)^{a}	3.25 (0.62)^{cd}	4.25 (0.75)^{b}	11.704***
	Overall Fit	2.91 (0.79)^{de}	2.50 (0.67)^{e}	3.16 (0.83)^{cd}	3.25 (0.75)^{cd}	5.16 (0.57)^{a}	3.58 (0.79)^{bc}	4.16 (0.57)^{b}	18.188***

*p<0.05, **p<0.01, ***p<0.00.
a>b>c>d>e : Groups with significant differences according to Duncan's test were noted with different letters.

Most companies received relatively low assessments under 4 in waist, abdomen circumference and hip categories. Compared with the 〈Table 1〉 which is mean physical measurements of the twelve subjects, waist includes ease of about 7.75 cm to 11.25cm and hip includes ease of about 6.7cm to 9cm. This is thought to coincide with the research result[29] that obese types in their 20's prefer smaller ease in waist and hip.

The products are also thought to have been designed with physical characteristics of middle age women in consideration whose waist and hip increase[30] rather than reflecting the physical characteristics of plus-sized women in their 20's and 30's whose flattening quotient in hip area is low.[31]

In upper arm circumference category, company A, I and Q received relatively high assessments of 4.25-4.66 and company G received the lowest assessment of 2.83. In cut in armscye depth category, company G, R and S received relatively high assessments of 4.41-4.58 and company I received the lowest assessment of 3.33.

In sleeve length category, company G and Q received relatively high assessments of 4.41-4.50 and company N received the lowest assessment of 3.08.All companies except company G and Q received relatively low assessment of 3.75. This coincides with the research result[32] that states the sleeve length to be one of the most frequently altered categories in jacket alterations and returns by consumers. Unnecessarily long lengths result in burdening the consumers with the financial cost of alteration.[33] In jacket length category, company Q received the highest assessment of 5.83, company G, I and N received relatively high assessments of 4.66-5.25 and company A, R and S received the lowest assessments of 2.91-3.33. This is thought to be because plus-sized women in their 20's and 30's are more satisfied with jacket lengths covering the larger hip and thigh areas as they have lower body obesity physique with developed hip and thigh areas.[34]

In neck area wrinkle category, company A, G and N received relatively high assessments of 4.58-4.75 and company Q received the lowest assessment of 3.41. In shoulder area wrinkle category, company N received relatively high assessment of 4.91 and all other companies received low assessments of 2.66-3.25. In armpit area wrinkle category, company G and S received relatively high assessments of 4.41-4.50, company I received the lowest assessment of 3.25 and all companies except company G and S received relatively low assessments of 3.83 or below. This coincides with the research result stating that upper arm circumference and armhole are uncomfortable areas while wearing jackets[35] and is identified as a category which needs attention during pattern designing when configuring cut in armscye depth and armhole.

In front princess line category, company Q received relatively higher assessment of 4.50 than the other companies and company G received the lowest assessment of 2.33. In back princess line category, company A, I, Q and R received assessments of 3.75-4.25 and company G received

29) Ibid., pp.17-29.

30) Boo-Hyun Sohn and Kyung-Hi Hong, "Development of Clothing Size and Grading Increments Chart for Women in Middle Age," *Korean Journal of Human Ecology* Vol.14 No.1 (2005), pp.107-117.

31) Hee-Jung Ha and A-Rin Kim, op. cit., (2003), pp.153-164.

32) Hee-Chun Lee and Won-Ja Lee, "Ready-mades Size system and Consumer Satisfaction on Women's Jackets: For Wome Aged between 20's and 30's," *Journal of the Korea Fashion & Costume Design Association* Vol.7 No.3 (2005), pp.27-38.

33) Hee-Jung Ha, op. cit., (2008), pp.30-32.

34) Hee-jung Ha, op. cit., (2008), pp.133-150.

35) In-Hwa Kim and Soo-Ae Kweon, "Ready-made Jacket Purchase Realities and Satisfaction Focused on Middle-Aged Women," *Journal of the Korean Society of Clothing and Textiles* Vol.31 No.3 (2007), pp.398-409.

relatively low assessment of 3.08. Princess line is a category with close relationship to bust point-bust point, hip and abdomen circumference and is identified as a category that needs attention during pattern designing as protruding areas in abdomen or hip can be covered using princess line dart setup and princess line area overlaps.

In front fit and silhouette category and side fit and silhouette category, company Q received relatively higher assessments of 4.50 and 4.91 respectively and company G received the lowest assessments of 2.58 and 2.91 respectively. In back fit and silhouette category, company Q received relatively high assessment of 5.00 and company N received the lowest assessment of 2.91. In overall fit category, company Q received the highest assessment of 5.16, company G received the lowest assessment of 2.50 and all companies except Q and S received relatively low assessments of 3.58 or below. In overview, only company Q received relatively high assessments of 4.0 or above in 15 out of 22 categories and the rest 6 companies received 4.0 or above in only 7 or 8 categories. The reason is thought to lie in size configurations and pattern designs of the most companies without considerations on the characteristics of lower body obesity physique in age groups of 20's and 30's with wide shoulders, relatively small waist area to hip area and developed hip and thigh areas.

3. Motion Fitness Assessment of Women's Formal Jacket Products by Companies

Subjects in their 20's and 30's were dressed size 88 formal jacket products collected from seven companies and motion fitness assessment was conducted by companies. The result is shown in 〈Table 6〉. Right-arm-up posture and both-arms-crossed-in-front posture categories showed significance differences among companies above $p<0.05$ level.

Detailed view of the categories with significant differences show that in right-arm-up posture category, company G received a higher assessment of 6.08 than other companies and the rest six companies received assessments of 5.00-5.66.

〈Table 6〉 Motion Fitness Assessment from Age Groups of 20's and 30's of Formal Jacket Products by Companies

Categories	A	G	I	N	Q	R	S	F-value
	M(S.D)	M(S.D)	M(S.D)	M(S.D)	M(S.D)	M(S.D)	M(S.D)	
Upright Standing Posture	5.25 (0.62)	6.25 (0.75)	6.08 (0.79)	5.91 (0.66)	5.83 (0.83)	5.66 (0.88)	5.75 (0.75)	2.116
Posture with Upper Limbs Moving Back and Forth While Walking	5.75 (0.62)	6.58 (0.51)	6.08 (0.66)	6.25 (0.75)	6.16 (0.71)	6.33 (0.65)	6.25 (0.62)	1.810
Both Arms 90° up Frontward Posture	4.41 (1.24)	5.50 (0.79)	4.66 (0.98)	4.91 (0.67)	4.75 (1.05)	5.16 (0.71)	5.00 (0.95)	1.713
Both Arms 90° up Sideways Posture	6.00 (0.60)	6.33 (0.65)	5.66 (0.88)	5.75 (0.62)	5.41 (0.79)	5.83 (0.71)	5.91 (0.90)	1.759
Posture with Right Arm Raised as much as Possible	5.66 $(0.49)^{ab}$	6.08 $(0.90)^{a}$	5.41 $(1.08)^{ab}$	5.25 $(0.75)^{b}$	5.00 $(1.16)^{b}$	5.08 $(0.66)^{b}$	5.50 $(0.67)^{ab}$	2.724*
Both Arms Crossed in Front Posture	4.00 $(0.60)^{d}$	4.75 $(0.75)^{bc}$	4.58 $(0.99)^{bcd}$	3.91 $(0.66)^{d}$	5.66 $(0.49)^{a}$	4.08 $(0.51)^{cd}$	4.83 $(1.26)^{b}$	7.148***
Bent Forward 90° Standing up Posture	5.00 (0.73)	5.33 (0.65)	4.75 (0.86)	5.16 (0.57)	5.08 (0.66)	4.83 (0.57)	5.25 (0.75)	1.127
Sitting on Chair 90° Posture	6.08 (0.66)	6.41 (0.66)	5.66 (0.88)	5.83 (1.02)	6.00 (0.73)	5.91 (1.08)	5.33 (1.30)	1.569

*$p<0.05$, **$p<0.01$, ***$p<0.001$.

a>b>c>d>e : Groups with significant differences according to Duncan's test were noted with different letters.

In both-arms-crossed-in-front posture category, company Q received the highest assessment of 5.66 and company A and N received the lowest assessments of 3.91-4.00. This is related to the results of the appearance assessments by companies in the 〈Table 5〉 where four companies received below 4.0 assessments in upper arm circumference category and three companies received below 4.0 in cut in armhole depth category and it is thought that it resulted from upper arm circumference or armhole depth being small. All companies received high assessments of 5.25-6.58 in most categories like upright standing posture, posture with upper limbs moving back and forth while walking, both arms 90° up sideways posture and sitting on chair 90° posture. This is in contrast to the appearance assessment and it is found that assessments of being very comfortable are not compatible with assessments of having good fit.

Ⅳ. Conclusion

The goal of this research is to specifically identify dissatisfactions related to the sizes and fits when purchasing jacket products online, using survey method to plus-sized women in their 20's and 30's and to provide basic data to assist in development of formal jacket patterns with excellent physical fitness that reflect physical characteristics of plus-sized female consumers in their 20's and 30's by conducting fit assessment and investigating and analyzing the fit satisfaction of size 88 jacket products collected from seven online companies. Conclusions from the study results are as follows.

First, dissatisfactory items on size and fit of plus-sized women in their 20's and 30's from online company jacket product purchases can be summarized to symbolic size marking, confusions from mixed use of size terms, absence of detailed size information, not having various sizes available, small shoulder width and armhole, waist and abdomen circumference with large ease, hip with small ease and long sleeves.

Second, appearance assessment of plus-size women's formal jacket products by online companies resulted in all categories except front-center line showing significant differences among the companies. Only company Q received relatively high assessments of 4.0 or above in 15 out of 22 categories including the overall fit category even though no significant difference was found among companies and the rest 6 companies received 4.0 or above in only 7 or 8 categories and low assessments of below 4 in 14-15 categories.

Third, motion fitness assessment of women's formal jacket products by online companies resulted in only right-arm-up posture and both-arms-crossed-in-front posture categories showing significance differences among the companies. All companies received relatively high assessments of 5 or above in most categories even though no significant difference was found among companies. This result is in contrast to the appearance assessment and it can be said that assessments of being comfortable are not compatible with assessments of having good fit.

In conclusion, it can be said that fits in shoulder area, armhole area, upper arm area, waist and abdomen area and hip area are areas where problems mainly occur during fitting women's formal apparel sold through online shopping malls. The reason is thought to lie in size configurations and pattern designs of the most companies without considerations on the characteristics of lower body obesity physique in age groups of 20's and 30's with wide shoulders, relatively small waist area to hip area and developed hip and thigh areas. As alterations in shoulder and armhole areas result in destroying the balance of jackets, those areas must reflect physiques when designing the patterns. Especially, it is thought that pattern development reflecting plus-sized women in their 20's and 30's is urgent in order to increase satisfaction with online company products from plus-sized female consumers in their 20's and 30's in which lower body obesity or triangular obesity with developed hip area and thigh area are majority. It is anticipated that pattern developments reflecting the physical characteristics of the wearers can increase fit satisfaction of formal jacket products from plus-sized female consumers.

The limitation of this study is that discretion needs to be taken in generalizing the study results as the basic jackets selected for the study were collected with size 88 as the standard and the subjects were convenience sampled with size 88 as the standard.

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