

The Development of Safety and Functional Snowboard Wear Design - Focus on the Safety Snowboard Pants for the Protection of Hip -

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Abstract : This research helps secure the safety of snow boarders in an activity that is currently recognized as a minor specific hobby. The research goal is to develop a new board wear product with intensified safety and activity through the development of a safe and convenient snowboard wear that is wearable in ordinary life. The participants consisted of 31 snowboard club members evaluated from January 12 to January 19 at Eden-valley Ski Resort and Phoenix-park Resort in Korea. The result are as follows. First, what domestic snowboard wear consumers consider design difference and brand recognition a significant priority in choosing snowboard wear versus the functionality or safety of clothes. Second, concerning the evaluation of the developed product, they recognize the necessity of safety gear; however, they demand the convenient use of a safety gear with a fixation that can be attached and detached. A unity-type board wear was developed that enables an attachment and detachment that reflects the evaluation results. In conclusion, this research showed various market possibility of board wear into sports casual wear to be able to make it a fashion product through different design and demand of mixing it with general wear rather than functionality or activity, though board wear is a professional sports wear.

Key words: snowboard wear, outdoor-sports wear, safety, functional, convenient

1. Introduction

Recently interest in sports and leisure activity including outdoor-sportswear products has been raised to many consumer. Resulted new market has shown up in various concept and function so much that in case of new brands that launched in the second half of 2012, 8 out of 43 are outdoor-sports wear or active-casual wear brands, level enough to threaten the existing traditional outdoor-sportswear brands. It may be said that the outdoor-sportswear market showed the most fierce competition in the second half of the year("2012 F/W New Brand Trend", 2012).

This shows a phenomenon that the market of functional sports-wear for outdoor-sports wear is expanded in the way that it is put on in daily life while occupying general casual wear market. There is consumers' choice with effective result at the background of such expansion of market and the existing outdoor-sports wear has the structure and material in the form specialized into professional-sports wear with various functionality. These products have been developed centering around the safety of human body and the convenience of function based on the skilled technology for a long time. Recent fierce competition in the market required reinforcement of product in terms of design and based on it, products' com-

petitiveness may have been brought about that can draw various consumers' attention.

Especially in consumers' position, putting on outdoor-sportswear with functionality in ordinary life might supply more safety and convenience than general casual wear. Therefore it is natural for the market to be expanded. In recent years, Ski and snowboard have been popularized as winter sports, as lifestyle improved and five-day work week expanded. As people who enjoy the professional snowboard have increased since 2002, snowboard look, a new outdoor-sports wear market, began to appear. Snowboard is a sort of sports, unlike the ski, that requires lots of movement of whole body like spinning round, squatting and standing up, making circle and bending etc. keeping a balance only by physical movement with no other prop in action. Because of snowboard wear has been large volume and the dual structure for the safety underpants.

At this point, the purpose of this research is to secure the safety of snow boarders' activity that is yet recognized as minor's specific hobby and to develop a new board wear product with intensified safety and activity through development of a safe and convenient board wear that is wearable in everyday life too.

2. Theoretical Background

2.1. Current situation and progress of sports wear industry

Sports wear industry developed apparently in the USA. It began to be developed as an industry, as sports activity began since 1850

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and a specific functional wear for sports began to be put on. Apparently the first practicalized wear was pants for cycling(Park, 2000). A structural suggestion was made to secure activity of the existing wear and that became a momentum for wear to progress into separation of coat and pants. Early stage of sports wear began in terms of function, but too much showing off. Therefore it worked as separator between everyday clothes and sports wear. Afterwards sports wear industry has seen growth together with the development of various sort of sports, as sports activity settled down as a significant daily culture.

Sports wear began to be advanced since 1950s and swimming wear made of latex, water-proof jumper one-piece dress style skiwear using elastic material were introduced. As various high-tech functional material was used after 1990s, sports wear developed as much as it influences upon human capacity and competition ability(Baik & Kim, 2005). As a result, many athletes tried to enhance performance with the support through development of high-tech equipment and high-tech material sports wear as well as personal ability. Accordingly sports wear development competition went fierce.

Such negative effect of developed equipment on the enhanced performance led to the conclusion that performance may not have to do with a swimmer's ability in swimming. Therefore Federation of International Natation Amateur(FINA) prohibited high-tech polyurethan material bodysuit since May 2010. This suggests that sports wear may not only work as a mere physical protector of an athlete, but have an effect on scoring(Song, 2009). As modern people have more free time due to the five-day workweek, everyday leisure sports activity has also been increased. Sports activity gets settled as a living culture that the public enjoy, not belonging only to specific sports athletes. Modern sports wear develops and its function is divided and separated into the professional athletes' sports wear that emphasizes functional side and the sports wear for the public to which fashion sense is added. As for such concept and characteristics of sports wear, Lee and Baik(2008) divided into active sports wear and sports casual wear and gave a definition to each one. Active sports wear has the purpose to guarantee free sports activity, protect human body safely and help to maximize the effect of exercise or physical activity and sports casual wear as the generalized wear in daily life that the activity and fashion sense of casual wear is added to the functionality of the active sports wear.

2.2. Tendency of sports wear-related research

Out of 99 researches in journals and theses conducted since 2000, the dominant 48 sports wear-related researches are about dress social psychology and consumer behavior. Then 16 researches have been made about fashion marketing. 12 researches have been made about fashion design and clothes material respectively. Only

1 research was made about the history of sports wear style, and aesthetics of sports wear style(Park & Kim, 2012).

There are 12 theses on design part that are related with direct development of sports wear ; thesis by Kim(2003) on the design process of sports wear and theses on material tendency and design plan(Kim et al., 2012; Baik & Kim, 2005; Lee & Baik, 2008). Fashion marketing-related theses that investigated the selective attribute of sports wear were mostly those theses on search benefit, selection standard and purchase behavior(Hwang, 2005; Hwang, 2007; Kim et al., 2010; Park, 2000; Rhee & Lee, 2011).

Researches that have a direct relation to board wear are; Research on the function and improvement required for board wear development based on the investigation of the realities of putting on snowboard wear(Ryu & Park, 2003); Research on the establishment of marginal quantity of men's snowboard wear pants(Ryu & Park, 2006); Quality assessment report of children's skiwear (snowboard suit).

Considering the preliminary research tendency as above, there have been lots of researches on sports wear in various themes, but not so many on skiwear and snowboard wear. As the sports population who enjoy snowboard tends to be increased, researches of function and convenience in various themes should be made on the functionality of snowboard wear, the development of products and the development of safety device.

2.3. Characteristics of snowboard wear and skiwear

Snowboard wear was popular, as a kind of sports wear with focus on its functionality, among some people who enjoyed a professional winter extreme sports. As people who enjoy the professional snow board have increased since 2002, snowboard look, a new sports wear market, began to appear. Ski and snowboard have been popularized as winter sports, as lifestyle improved and five-day work week expanded.

Snowboard wear is a product with high demand of functional aspect as well as design and aesthetic aspect. It should have a function to protect human body from external natural condition with its material that has the nature of heat insulation, water-proofing, wet-transmission and wind-proofing that winter sports wear should have, motor-function in terms of form to help easy and comfortable body action, and a function to protect human body from intense exercise.

In the research to find improvement through reality investigation of putting on snowboard wear in terms of function, inconvenient parts are indicated as follows; "crotch of trousers - tightened or popped", "buttocks - improper diameter of pants and length of bottom-up and inconvenience when wearing protect guard" and "waist - inconvenient adjusting gear and snow soaking into waist"(Ryu &

Park, 2003). Snowboard is a sort of sports, unlike the ski, that requires lots of movement of whole body like spinning round, squatting and standing up, making circle and bending etc. keeping a balance only by physical movement with no other prop in action. There is very high risk of injure, as an athlete moves while gliding down in a fast speed from high place. Therefore the athlete should put on a safety wear inside the snowboard wear or protective guard on buttocks and knees. It is natural that the hip-hop style dominates because it is baggy and bulky to make free movement of body and to keep the safety guard from coming out(Ryu & Park, 2006).

The quality test of children skiwear(snowboard wear) currently in the market("Children's skiing", 2010) shows that the most frequent complaint by consumers is about quality. The complaints are tolerance to laundry, dyeing, durability and functionality in order. Consumers are expecting a functional product that is thin guaranteeing convenient movement and equipped with heat insulation function against severe cold.

Followings are the current tendency of snowboard wear. Oakley designed a new goggle as a equipment of safety for those who enjoy ski and snowboard that includes a display with which to be able to see GPS sensor preparing for isolation in a mountain, blue-tooth, speed and location, attitude and distance covered. Oakley also utilized the goggle to be able to read text message or e-mail through a screen("JWT 100", 2012).

In ISPO 2013 Report, products that awarded the Product of the Year in ski part were one that is very thin in functional and tight 3D structure that guarantees dynamic ski performance and another that has a backpack with ski carry system and ski pole that enables strap linkage. Those are products that enhance functional aspect and emphasize convenience("ISPO Report", 2012).

The snowboard wear currently in the market is a very bulky and baggy hip-hop style as a Fig. 1. A protective underwear, that is stick to body, should be put on for safety guard gear as a Fig. 2. Putting on this underwear, however, brings about inconvenience to action due to the dual structure of the clothes and makes the clothes bulky. As such the design has a limit to develop. Accordingly, this research tries to present a snowboard wear of new concept added with functionality and esthetics, aiming at the development of underwear mounted with safety guard to help convenient snowboard activity for boarders' safety and convenience.

3. The Method and Process of Research

The method of this study are as follows: The first step was development of snowboard underpants attached with buttocks guard and then was to analysis on the evaluation after wearing underpants. Finally, modification of the product were complementary.



Fig. 1. Hip-hop style snowboard pants. Dori Company Leaflet



Fig. 2. Underwear for safety guard gear. <http://www.google.co.kr>

The problem of this study are as follows: The first inquiry is to factor of effect on purchase decision of snowboard wear; the second is to analysis on the evaluation after wearing developed snowboard product safety underpants.

3.1. Development of snowboard underpants attached with buttocks guard

Concerning development of snowboard wear, buttocks safety guard was developed to secure snowboarders' safety as Fig. 3, referring to preceding researches(Kim et al., 2012; Lee & Baik, 2008; Ryu & Park, 2006) and considering functional factors(safety and convenient activity) and aesthetical factor(design).

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In the research to find improvement through reality investigation of putting on snowboard wear in terms of function, inconvenient

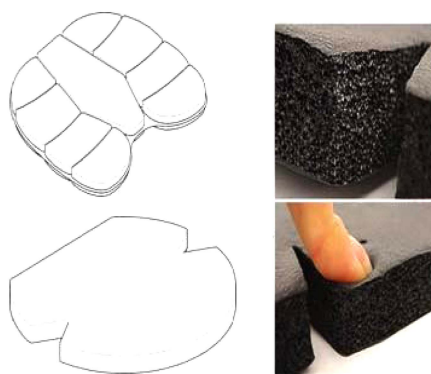


Fig. 3. Schematic of safety pad & material.



Fig. 4. Leggings with safety pad for Buttocks.

parts are indicated as follows ; “crotch of trousers - tightened or popped”, “buttocks - improper diameter of pants and length of bottom-up and inconvenience when wearing protect guard” and “waist - inconvenient adjusting gear and snow soaking into waist”(Ryu & Park, 2003). Therefore, Snowboard underpants made of stretchy knit material for activity & convenience like leggings-style and then were attached safety pad for buttocks to the straps on the waist as Fig. 4. The safety pad for buttocks given the curvature of the human body into several pieces were made by connecting as Fig. 3. Select the style was printed leggings for aesthetics.

3.2. Evaluation test

As for evaluation of produce sample, wearing evaluation was carried out to professional snowboarders at early January. Evaluation participants were 31 snowboard club members and the evaluation was carried on 12-19 January 2013 at Eden-valley Ski Resort and Phoenix-park Resort.

As for evaluation method, participants were supposed to write the evaluation of wearing at the questionnaire after a fixed time on a snowboard wearing the sample presented and moving freely. As for evaluation method, 8 contents about purchase decision factor were questioned. As for the question of evaluation over wearing the developed safety underpants, it was composed of 9 contents and 5

Table 1. The current demographic statistics of respondents

Concent		Frequency (Person) <i>N</i> = 31	Percent(%)
Sex	Male	20	64.5
	Female	11	35.5
Marriage	Yes	7	22.6
	No	18	58.1
	Unknown	6	19.3
Age	20s	20	64.5
	30s	11	35.5
Income (Won)	1,000,000	5	16.1
	2,000,000	11	35.5
	3,000,000	10	32.3
	4,000,000	4	12.9
	5,000,000	1	3.2
Personal Expences (Won)	100,000	12	38.7
	200,000	4	12.9
	300,000	7	22.6
	400,000	4	12.9
	500,000	4	12.9
Occupation	Profession	5	16.1
	Student	8	25.8
	Office Worker	14	45.2
	Etc	4	12.9

point Likert scale on external appearance and safety, activity evaluation and convenience. Besides, 2 contents of free interview question were included and evaluated on the improvement of currently developed snowboard product safety underpants.

The current demographic statistics of respondents who participated in questionnaire is as follows Table 1.

4. Result of Research

4.1. The factor of effect on purchase decision of snowboard wear

Most of the evaluation participants had clothes exclusively for riding a snowboard and the most participants answered 300 thousand won(38.7%) for the proper price to purchase professional snowboard wear. Major purchase place was different from general fashion products and special agent(48.4%), department store (25.8%) and on-line merchandising agent(25.8%), showing a preference for special agent. The criteria in choosing preference purchase brand was design difference(48.4%), brand recognition (38.7%) and functional difference(9.7%) in order. It showed that it is sports wear, but design difference is still very important criteria in choosing preference purchase brand. This phenomenon appears

once again in the question of the most important choosing factor when purchasing snowboard wear. The answer was design(58.1%) and brand(35.5%) suggesting that choice is made by design and brand. Great consideration in design preference was silhouette, that is, style with as much as 61.3% weight, then color(22.6%), material and pattern(9.7%) and popularity(6.5%), suggesting priority is put on design difference rather than on popularity. The greatest consideration in the sense of wearing was convenient activity(54.6%),

Table 2. The factor of effect on purchase decision of snowboard wear

Contents		Frequency(Person) N = 31	Percent (%)
Own Snowboard suit	Yes	22	71
	No	9	29
Proper price	100,000	5	16.1
	200,000	6	19.1
	300,000	12	38.7
	400,000	6	19.4
	More than 400,000	2	6.5
Distribution Channels	Special Agent	8	25.8
	Department Store	15	48.4
	Outdoor Sports wear Store	0	0
	On-line merchandising agent	8	25.8
Preference Choosing brand	Brand Recognition	12	38.7
	Design Difference	15	48.4
	Functional Difference	3	9.7
	Function(Safety and Material)	1	3.2
Preference Choosing brand for Snowboard Wear	Design	18	58.1
	Fitness	0	0
	Convenient	1	3.2
	Safety	1	3.2
Design Preference for Snowboard Wear	Brand	11	35.5
	Color	7	22.6
	Silhouette	19	61.3
	Material and Pattern	3	9.7
Sense of wearing	Popularity	2	6.5
	Convenient of Activity	16	51.6
	Heat Insulation	10	32.3
	Fitness	0	0
Function of Snowboard Wear	Convenient in wearing	5	16.1
	Stability of Form	2	6.5
	Heat Insulation	8	25.8
	Waterproofing	7	22.6
	Safety	0	0
	Convenient of Activity	14	45.2

heat insulation(32.3%) and convenience in wearing clothes (16.1%). The greatest consideration in the function of snowboard wear was convenient activity(45.2%), heat insulation(25.8%), waterproofing(22.6%) and stability of form(6.5%). Other opinions about improvement demand of the existing snowboard wear were “high price”, “improvement of heat insulation”, “enhancement of activity”, “various design” and “wear-ability into general clothes” (Table 2).

Above result suggests that in case of snowboard wear, design and style takes more significant than the functionality of material, motion functionality in terms of form and protective function of body that were discussed in preceding researches on sports wear purchase decision factors and the functionality of sports wear(Ryu & Park, 2006).

The reason is that snowboard is characterized by its main consumers in their 20s and early 30s men who have a distinctive taste in pastime activity, frequently move within a club showing a collective sense of difference.

4.2. Analysis on the evaluation after wearing developed snowboard product safety underpants

As for the evaluation after wearing developed snowboard product safety underpants, followings are the evaluation of respondents as Table 3. It was produced as an improved form from the existing safety underpants with no inconvenience.

Higher than average response is as follows; “This Safety Underpants can be used as a underpants for snowboard suit(3.39)”, “This safety technology is more advanced existing products underpants(3.35)”, “This Safety underpants has been developed to ensure the safety of the wearer(3.52)”, “Safety pad is a practical safety of underpants(3.23)”, “Safety pads are required for the safety of the border(4.84)”. On the other hand, Lower than average response is as follows ; “This Safety underpants can be used as a pants for the daily life(1.61)”, “This Safety underpants is inconvenient for wearing(1.77)”, “This safety underpants is make inconvenient for the activity of walking(2.03)”, “This Safety underpants is make inconvenient for activity of snowboard(1.94)”.

There were other private opinions like “adjustment of location of safety guard necessary”, “fixation of safety guard”, “revision of activity” and “improvement of heat insulation”.

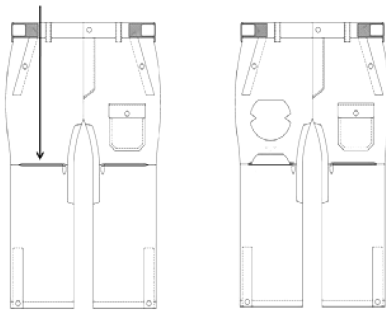
This product was manufactured in leggings style that prepares the existing function of safety underpants and at the same time the function of outdoors wear, but a demand of modification has been presented into the type easy to adjust the location of safety pad or to attach and detach the pad.

Therefore this research tries to present a revised and supplemented design of pants-type snowboard wear that it is easy to

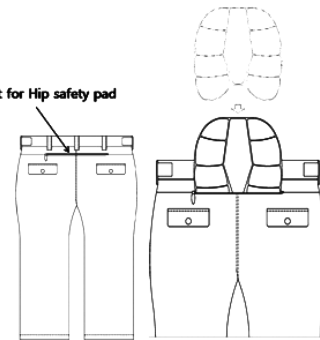
Table 3. The evaluation after wearing developed snowboard product safety underpants

Contents	The standard deviation	Average
This safety underpants can be used as a underpants for snowboard suit.	.761	3.39
This safety underpants can be used as a pants for the daily life	.844	1.61
This safety technology is more advanced existing products underpants.	.798	3.35
This safety underpants is inconvenient for wearing	.717	1.77
This safety underpants is make inconvenient for the activity of walking	.948	2.03
This safety underpants is make inconvenient for activity of snowboard	.892	1.94
This safety underpants has been developed to ensure the safety of the wearer.	.769	3.52
Safety pad is a practical safety of underpants.	.717	3.23
Safety pads are required for the safety of the border	.454	4.84

Pocket for knee safety pad

**Fig. 5.** The pants with safety pad (Front side).

Pocket for Hip safety pad

**Fig. 6.** The pants with safety pad (Back side).**Fig. 7.** The pants with waist protection gear**Fig. 9.** The pants with ankle protection gear.

attach and detach the safety pad. The revised and supplemented snowboard wear improved and established a pocket-type safety pad slot on buttocks and knee part in order to attach in necessary.

This improved the inconvenience of the existing snowboard wear to put on an extra underpants for safety guard and developed an improved product as Fig. 5, Fig. 6 to fit for the demand of consumers by referring to preceding researches and securing proper margin of activity for the sake of convenience of movement.

The improvement of heat insulation was used elastic water-proofed dual-medium weight twill textile. The pants was attached extra waterproof textile strip inside the hem-line for protection waist and ankle from snow as Fig. 7 and Fig. 8.

5. Conclusion

Followings are the results of the research. First, what domestic snowboard wear consumers take significant as priority in choosing a board wear was design difference and brand recognition rather than the functionality or safety of clothes. They present high price, heat insulation and compatible with general clothes as factor of improvement. Second, concerning evaluation of the developed product, they recognize the necessity of safety guard, but demand convenient use of safety guard with fixation and the form to attach and detach. Lastly, a unity-type board wear was developed that enables attachment and detachment reflecting the result of evalu-

ation. In conclusion, this research showed various market possibility of board wear into sports casual wear to be able to make it a fashion product through different design and demand of mixing it with general wear rather than functionality or activity, though board wear is a professional sports wear. This study was developed through evaluation of the snowboard wears in the development of consumer-oriented design is significant. The limitations of this study was design-oriented products development through evaluation of consumer. The ergonomics study for product design has been to the exclusion.

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