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Development of Camping Equipment with Carbon Nanotubes and Management Strategy

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Abstract

It was reported that camping equipment market is expected to increase continuously and quickly. However, Korean domestic companies could not produce high-end technology products through scientific research and development; despite they have a high technical competence and good infrastructure. In order to solve the problem, direction and goal of researches and developments should be clear. The domestic outdoor industry organizations have focused on the short-term profits and did not pursue in-depth scientific researches. Therefore, it is needed to make long-term plans which are comprehensive and systematic to strengthen the competitiveness. In this study, authors incorporate nanomaterials to camping equipment as high-end technology and suggest strategies to promote competitiveness through the nano-technology, effective planning and management.

Keywords: Carbon nanotubes, Nanotechnology, Management, Camping equipment, Composite

Introduction

The size of the consumer market of North America Outdoor industry is annually 6,460 million in US dollars. The North America Outdoor industry has produced more than 610 million related occupations and therefore the employment effect is also significant. However, there has been the fierce competition to seize the consumer's time and money in the outdoor industry. The one of the outdoor activities is a camping. The market of camping is a new growth industry with continued growth and steady expansion of the participating populations. However, Korean domestic companies could not produce high-end technology products through scientific research and development; despite they have a high technical competence and good infrastructure. In order to solve the problem, direction and goal of researches and developments should be clear. The domestic outdoor industry organizations have focused on the short-term profits and did not pursue in-depth scientific researches. Therefore, it is needed to make long-term plans which are comprehensive and systematic to strengthen the competitiveness. In this study, authors incorporate nanomaterials to camping equipment as high-end technology and suggest strategies to promote competitiveness through the nano-technology, effective planning and management.

Carbon Nanotubes and Marketing Strategy

It is well known that carbon nanotubes have high conductivity, high thermal conductivity, high tensile strength, high elasticity, high absorbency, and high aspect ratio. [1-7] The unique electrical, physical and chemical properties of carbon nanotubes show the potentials to lead the innovation of the various applications. [8-11]

Figure 1 shows a transmission electron microscopy image of multi-walled carbon nanotubes. As we can see from the figure, the diameter of multi-walled carbon nanotubes is about tens of nanometers and it is composed with several numbers of carbon walls. Due to the multi walls, the multi-walled carbon nanotubes generally show electrically metallic behavior. However, single-walled carbon nanotubes have only one carbon wall and show either semiconducting or metallic behavior.

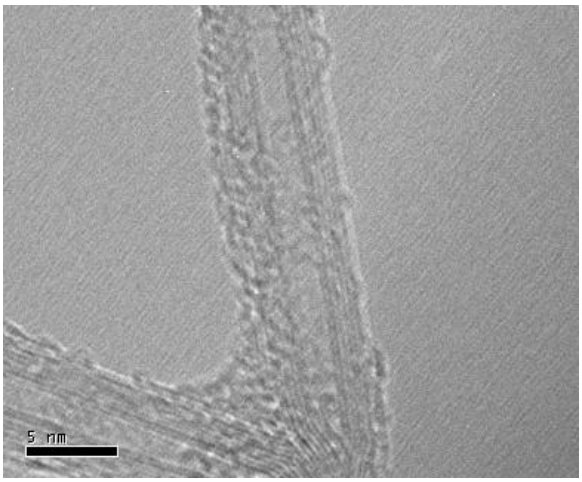

Fig. 1. TEM image of multi walled carbon nanotube

The largest area of Korean outdoor industry is a camping industry which acquires 22.2% of whole outdoor industry. The 3,800 million Americans who are older than 6 years old are enjoying the camping and the number is up to 13% of the total population. According to a survey of camping population who are older than 18 years old, the sleeping bag (65%) and tents (62%) are selected as the most necessary goods for camping. In addition, the campfire materials, clothing, lanterns, gas stoves, footwear, air mattresses are also selected.

In particular, outdoor and camping supplies made of functional materials which are lighter, stronger, durable, and easy to carry are popular for camping population even though their price is more expensive. The excellent quality by using functional materials is much competitive than low-cost materials in camping market. In a case of tent, lower weight, solid durability and thermal conductivity can be achieved at the same time based on the nanotechnology and nano-composite materials. The weight of the tent can be reduced with the low density characteristics of carbon nanotubes. The torsional rigidity of frame can be increased also due to the high strength of the carbon nanotubes. Therefore, the nanotechnology and nano-composite materials can produce lighter and stronger tents. The fabric and frame of tent can be produced by a coating of carbon nanotubes on the existing materials and/or by adding carbon nanotubes directly to the base materials. For the direct addition method, it can improve material properties better than the coating method due to larger amount of carbon nanotubes introduced in the material.

Currently, Korea has a world-class competitiveness with technology of carbon nanotubes and its composites. And some number of companies has been producing high performance carbon nanotube composites. However, 87.5% of those domestic companies are small and, moreover, only 37.6% of those were successful for the commercialization of nanomaterials. In particular, carbon nanotubes were rarely used for the outdoor goods. Considering the improvement of performance, the economic value, and the growth rate of the market, it is urgent to do research and development of the nanomaterial composite. However, domestic companies with good technology have difficulties with finding investors, researcher, network, and etc.

Therefore, for marketing of nanomaterial composite, a marketing planning is the first thing to do. It is needed to set a goal for marketing activities and you should consider how you will distribute the resources needed for the objectives. Also, we should always think about the results and we should always check the specific stage of marketing management process.

Function and Development

Camping can be thought as a typical form of combined outdoor activities, but usually the place of campsite is limited. So, sometimes camping equipments are recognized by fashion items. Therefore, the majority of the camping population has a tendency to prefer expensive foreign brands and colorful equipments. The tent has the waterproof and water-repellent coating on the fabrics such as polyester or nylon. It also has functions of preventing condensation due to the gap between the main body and roof and UV protection. Tent body itself is a sleeping room and a space for catering. It is configured to seeking a pleasant camping while also preventing the rain and wind. The tent poles are generally supporting the body with two or more poles without outside help. The tent poles has been using a lot of materials from general steel or reinforced plastic former and recently also using aluminum which is strong and light weight also. The thickness of the pole is important because they are under a lot of pressure. Peg serves to shape and stability of the tent while holding the tent on the ground. Peg material is steel, plastic or expensive duralminum. The duralminum can be broken by excessive force, while steel is heavy and strong instead. The plastic can be easily broken.

The main characteristics that determine the performance of the tent are weight, flexural strength, and torsional rigidity. These characteristics are important for supporting body and easy handling. When the carbon nanotubes are applied to the tent body, peg, and others, following factors will determine the characteristics and performances. First, the amount of carbon nanotubes added to the base material. It is an important factor determining the characteristics of the tent. If the amount of carbon nanotubes added is increased to reduce the weight of the tent and it can effectively increases the bending stiffness and torsional rigidity. However, if the amount of additives, carbon nanotubes, is overwhelmingly large compared to the main material, such as steel, duralminum or plastic, the properties of composite can be worse. And excessive weight reduction can lead to deterioration of the tent, so it will require appropriate adjustment of the added amount.

The degree of dispersion for carbon nanotubes is an important factor that determines the characteristics of composites as well. When the degree of dispersion is poor, then carbon nanotubes densities in certain portions of the composite are not uniform and will not show uniform characteristics. Moreover, it can decrease the bending stiffness and torsional rigidity. Dispersion of carbon nanotubes is very important and appropriate control is required.

The selection of the main material is a significant factor in determining the characteristics of a tent. Carbon nanotubes are an additive to be added to the main material such as graphite, steel, duralminum, plastic, or stainless steel. Therefore the property of the main material is the major factor that determines the characteristics of the shaft. The major factors that determine the characteristics of golf club shaft are amounts and degree of dispersion of carbon nanotubes and type of main material.

In the aspect of marketing, manufactured goods are tested by experts and should analyze the impact of a tent in the camping. Using the analyzed data, identify the problems of the manufactured goods, and again making the tent with improved properties after running the simulation again. By repeatedly performing these series of processes, and satisfying the function required in the field. Finally, the products of new materials are proved through expert groups and maximize the marketing effectiveness.

Conclusion

In this study, we suggested the design techniques for camping products applied nanomaterials, carbon nanotubes, according to the bending stiffness and the torsional stiffness to have the optimum conditions. Moreover, we proposed marketing plans for the new technology camping products. We suggested a way to combine the new technologies with managements and planning for marketing. For marketing of nanomaterial composite in outdoor industry, the marketing planning is the first thing to do. It is needed to set a goal for marketing activities and you should consider how you will distribute the

resources needed for the objectives. Also, we should always think about the results and we should always check the specific stage of marketing management process.

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