

**A Project management model for co-op project between academy and industry: “*Package for the Future*” project between Seoul National University and Lotte Aluminum**

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### **Introduction**

Element for creating good design contains designer’s capability, client’s mind, and task environment, and the process creating new design should be very important element for constructing satisfactory result. Design project between industry and university deals with the contents of project management, process and outputs. Most design project is composed of strategy, design, and performance, and by the characteristic of the project, there needs decision on which each step should be strengthened or weakened. However, this is the case for a project manager to control team members, when there are different members from different fields, and for driving the project without knowing individual’s ability and characteristic. This project was completed with one design research institute, three design schools, and three different majors with clients who didn’t have any co-operation with design-related organization before. However, the project had one same purpose of design innovation. As for a project manager, I considered the method for completing the same objective from various groups with different interests, and intended to share its processes and results. For the better understanding of the project, background and contents of the project will be explained in next chapters.

### **Overview: “Package for the Future”**

Department of design of Seoul National University(SNU), Package R&D Center of Lotte Aluminum Co., Ltd(Lotte Aluminum)<sup>i</sup> have performed the research of “Package of the Future” for the last 1 year. Lotte Aluminum is the company who is manufacturing flexible packages such as PP, PET and hard packages like aluminum cans as well as producing and manufacturing aluminum materials mainly targeting Korean and Japanese markets. The scale of Lotte Aluminum is the biggest in Korea among the manufacturers

dealing with similar items. Lotte Aluminum mainly focused on innovations through technologies such as development of material, and development of package manufacturing technology, but with the foundation of Package R&D Center the company began to expect the business model of package innovation through new designs. With the purpose of innovation program within the company, Lotte Aluminum suggested the co-operative project with SNU design for achieving continuous ideas on how to utilize design in industries with the development of new package designs. There was no design department in the company, and without having any idea of how design would provide the help to increase the profit of the company, Lotte Aluminum prepared the co-operation with design university with Thomas Watson Jr.'s belief of "good design is good business."

### **Company outlines**

Basic forms such as PET bottle, aluminum, steel can or plastic package were manufactured first, and design was modified by the demand from beverage or confectionery companies. Package design should be able to reflect the identity of beverages and confectioneries which are very important element on package design, and transformation of product reflecting identity wasn't able to evolve to company's profit, and this task structure wasn't able to play innovative role to lead package market. And from the viewpoint of company's product quality, it should be the product in the step of *Specific*<sup>ii</sup>.

Multinational companies such as Amcor<sup>iii</sup> and Japanese company DNP<sup>iv</sup>, as we considered them as role models while we were performing the project, socially and culturally influenced our project while creating new user experience of food and beverage markets and changed the design paradigm as well as created the company's profit with innovation. Consequently, new aluminum package design research center should have the target of innovation, and we created a new project team for achieving the goal.

### **Industry-university cooperation**

Research purpose of university and enterprise generally known as industry-university co-operation is different from the table below(Fig.1). Existing industry-university research which I have participated was

mostly focusing on results created with long-range plans from the viewpoint of university. However, this research, as its biggest purpose was to make immediate profit of enterprise which was a collaborating researcher with us, had different characteristic with previously performed projects. The company not only simply expected package design as they requested to design companies, but also had a lot more considerations on fundamental direction in which package design could change user's lifestyle. Eventually as they knew well about that the purpose of creating profit should be based on knowledge of long-range and fundamental vision, they expected the result which was satisfying long and short-ranged vision of design.

Fig. 1 Different properties on the vale of behavioral principal between industry and university<sup>v</sup>

	Academy	Industry
Essential and behavior principal	Knowledge production within long ranged and fundamental viewpoint, the quest for truth, education(lecture), research on training manpower(new principal, discovering phenomena, analysis, criticism, systemization), social service.	Short ranged, maximization of short-sighted profit, creation of market value, increase on sale, profit, distribution, invention, becoming practical, manufacturing, market, employment, management related to creation of industry.
Value	Pursuing academic freedom, principal of realizing research output(including open lectures)	confidential(keeping the secrecy on business), limited open lectures

### Goal

As it is mentioned before, the purpose of this project is extremely simple but hard. It is about “the development of new package.” We divided the objective into three different categories of “raise on design

mind of enterprise for developing new package/ establishment on design method for developing new package/ development of new package,” and this, in other words, widened the purpose. Why did they establish this goal? For creating innovation through design from enterprise the preparation basis for performing this innovation was very important, and foundation of innovation was based on domestic task processes or reorganization. Three categories mentioned above could be turned into composition of new organization form, suggestion of system for improving design thinking, and application of advanced design of academy to enterprise.

### Organization structuring

First, for initiating the project we had to construct new organization. As it was different from projects performed by enterprises, for projects related to academy and enterprise it was very hard to perform the project while only specialists were present. However, it is easy to acquire fresh ideas of students in university-industry projects, and it is possible to perform fundamental researches which can not easily be performed by enterprises. It always has been worries for us to perform project with members without the

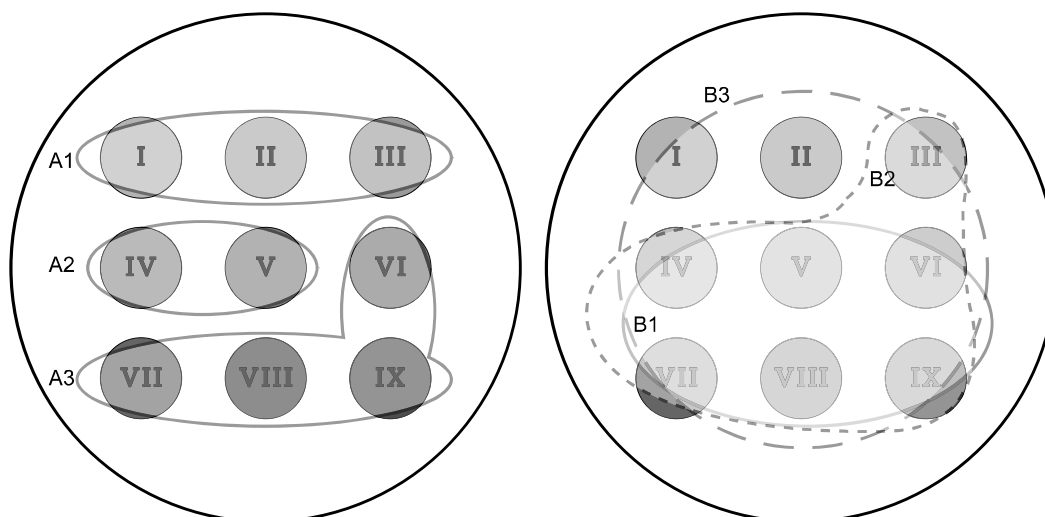


Fig. 2 Differences of structure between A group(Left) and B group(Right)

- |                                    |                              |                        |
|------------------------------------|------------------------------|------------------------|
| I: Researchers from Lotte Aluminum | II: Professors               | III: Researchers, KDRI |
| IV: Graduates, SNU                 | V: Graduates, Yonsei         | VI: Undergrads, SNU    |
| VII: Undergrads, Gyemyung          | VIII: Undergrads, Kyung Book |                        |
| IX: Undergrads, Woosan             |                              |                        |

verification of their capabilities. First of all, we created a complex structure containing horizontal and vertical axis without constructing the organization beforehand. The project team was composed of researchers of Lotte Aluminum Package Center who was our client, professors of Seoul National University Department of Art and Craft, undergraduate students, graduate students, researchers from Korean Design Research Institute, and graduate students of Yonsei University Department of Design<sup>vi</sup>. We divided the group into A axis and B axis(Fig.2), This group was not supposed to be exclusive to each member as members belonging to A group also could become a member of B group. Vertical A axis is about capability of team members. A group based on current capability of members was composed of A-1) research planning and investigation group (researchers from the company, professors, and researchers), A-2) research performing group(graduate students), and A-3) research supporting and user group(undergraduate students). Research planning and investigation group(A-1) was in charge of project management of overall researches, and they were playing a role in evaluating and responsible for decisions on instructions during the research period. Also A-1 group performed design education to clients who were not experienced with design process while inviting professors or related specialists from the package design area for seminars. Research performing group of A-2 was responsible for developing new package designs while performing actual researches and analysis to conclusion. A-3 group was composed of undergraduate students, and they were responsible for supporting the task of research performing team as well as playing a role of user who actually used the package samples. A group was the basic model which could be easily found when performing the project. On the other hand, B group was divided based on research boundary and the group was divided into B-1) idea producing group(undergraduate and graduate students), B-2) product trend research group(undergraduate and graduate students), and B-3) product improving group(professor, undergraduate and graduate students, researchers from the company). Idea producing group of B-1 was to provide idea of new package design. This group was performed with other researches and was merged at the latter part of research process. The idea group was the brainstorming group who was providing ideas for the new packages, and performs hundreds of sketch outputs. This group included both A-2 and A-3 group and had hierarchy when A group was performing

tasks. However, B group developed their ideas while freely providing and receiving ideas each other without having hierarchy. On the other hand, members playing a role of a user who was using packages of A-3 group created the system(Idea Matrix) which enabled users to freely receive and provide the problems in package. More detailed explanation on Idea Matrix will be following on next chapter. B-2 group was to research product trends. There were plastic package for chewing gums and ice cream pouches(Fig.3) which were very popular in Korean market. There definitely was cultural and social influence of that these



Fig. 3 Plastic package for chewing gum(Left), Flexible pouch for Ice cream(Right)

products became popular to customers, and B-2 group analyzed influence and performed the task which was suggesting what kind of packages would be used in near future. This, in other words, was trend research using simple PEST (Political, Economic, Society, and Technology). As B-1 group produced new ideas on packages with futuristic images, B-1 group was organized with endeavor which approached innovation based on solution on feasible problems such as problems on using packages, improvement on materials, and improvement on efficiency when manufacturing. The forward part of the research was performed with divided groups, and based on trend results of B-2 group and considering usability and efficiency of B-3, we transformed ideas from B-1 into feasible ideas. And these 6 organizations performed the project.

## **Idea Matrix™**

For technology-based Lotte Aluminum Package Center to achieve design-oriented package innovation for near future our project teams constructed web-based system named Idea Matrix. This Idea Matrix was originated from constructing framework for producing ideas needed by B-1 team, and initiated its task with the purpose for discovering sources from our normal lives which could become an idea of package design. The most usual method for creating ideas in B-1 team was brainstorming. As team members created new ideas on packages, while categorizing, condensing, combining, and refining hundreds of new ideas, the group developed more realizable ideas. We investigated the idea sources which team members brought from. Unfortunately there weren't clear statistics, but it was the method for improving inconvenient points from existing products, utilizing designs which were applied to different kinds, and developing ideas from others which were the most common method. There was a little bit of differences, but we decided to construct the system enabling us to develop other's ideas while accumulating ideas from our normal life as we were considering that Kaleidoscope brainstorming was very useful as it was evaluating and inducing ideas of others. Idea Matrix (Fig. 4) is database collecting sources of images and words which is becoming the idea of package. Collected images and words on Idea Matrix can be evaluated by technicians from Lotte Aluminum, product planner, and designers using simple check box.. Idea Matrix is one of the most important deliverable on this project and the reason can be explained below. First, as it is mentioned before, Idea Matrix is the democratic system where everyone can create and develop ideas on the web. The program based on the web lets anyone within the company provide the ideas on package design, and package related technicians of companies, planners, marketers, and designers are able to consult and develop ideas. Second, we wanted to help an enterprise to voluntarily perform the tasks related to package designs without the help from specialists even after the completion of this project, and effort is well reflected on this system. The system not only enables remote evaluation on design, but also plays a role of a facilitator who performs very important role when brainstorming. Third, the program also can be a result considering the method for design to be effectively appearing in enterprises. We thought that design in Lotte Aluminum should be handled with bottom-up method,

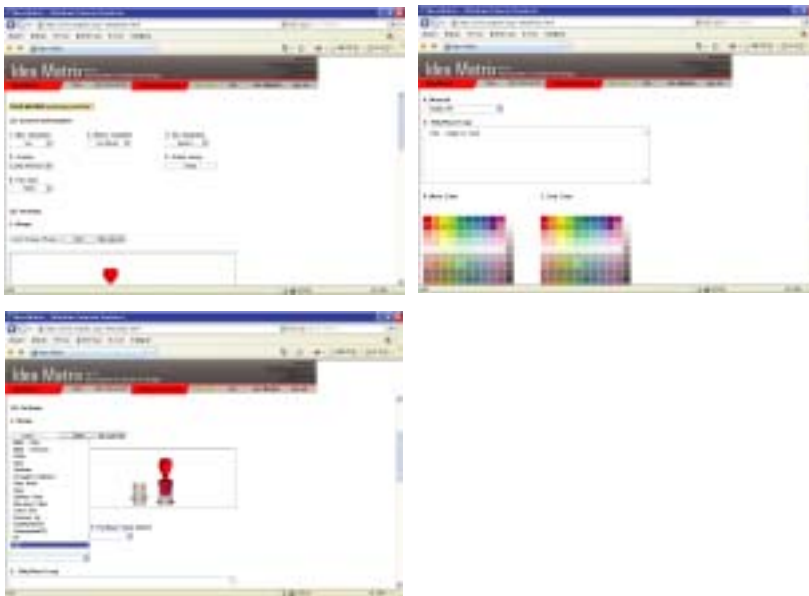
Input



Research



Development



Evaluation



Fig. 4 Still cuts of Idea Matrix interfaces

because it is very hard to create design strategy from the company as Lotte Aluminum is not the design-based company. Idea Matrix is currently used as a tool for accumulating package ideas in Lotte Aluminum. The matrix systemizes simple thinking process of designer in systematical way, and enables general companies to have an evaluation standard with sustainable design ideas.

### Periodical university-industry conference

There need a number of conflicts and mediation between fresh ideas and feasible design for manufacturing. Compared to our experiences of the past, Research in academies used to be mostly focusing on near future for the next 10 years, but this project was mainly focusing on immediate innovation. Therefore, for realizing ideas of researches understanding and studying on manufacturing method was needed. For discussing realization method, A-1 group had weekly meeting on manufacturing with Lotte Aluminum with outputs created from different groups. Specialists related to manufacturing technology from Lotte Aluminum and marketing specialists had discussions over feasibility of ideas with A-1 team of Seoul

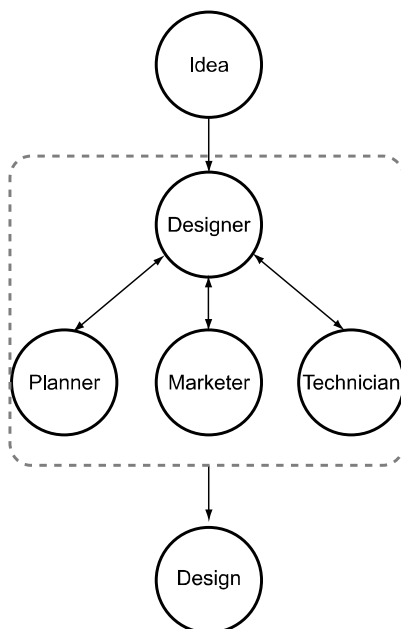


Fig. 5 Design feasibility evaluation team

National University(Fig.5). With the feasibility we classified them into feasible ideas and ideas which could be applied within next 5 years, and discussed on technological mediation method on its possibility for application. With verification on usability and marketability, we made mock-up model with package ideas from idea developing group of B-1 and functional package design idea constructed from product improving group of B-3.

As Lotte Aluminum was not well experienced with changes and transformations in the technology application standard of product affected by design, they realized importance of a result in which design-driven product can achieve from the market, and project team members also experienced the gap between advanced research and manufactured design as well as realized the importance of advanced design.

Through sustainable idea creation and verification of project teams, 20 different package mock-ups including Air Pack™, Inner Cap™, and FlexPET™ has been produced. This shows that sustainable idea

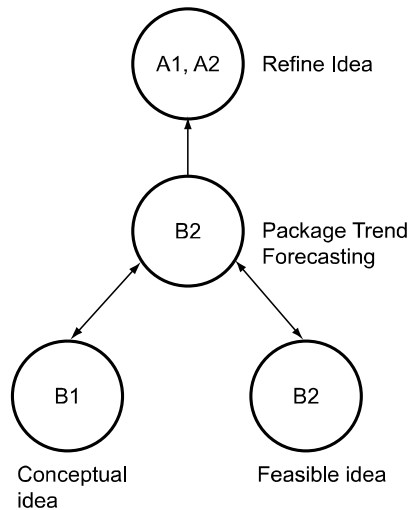


Fig. 6 Idea verification process

from A-1, A-2, A-3, B-1, and B-3 has been arranged based on trend research from B-2(Fig.6). Currently one of those ideas is in the process of patent application, and 11 ideas were registered as design copyrights. If we can find structural solution focusing on design, and register the design for influencing enterprises' profit, this will be very successful management. Lotte Aluminum still has continuous co-operation with Seoul National University for improving design of an inner cap which has been applied for patent.

## Conclusion

Design co-operative project of university, industry, and institute in Korea has a series of contradictions. It's hard to perform advanced study in the company except for large corporations, but advanced research is generally performed in universities. However, university-industry cooperative project from engineering field supports the project technologically and financially when constructing advanced technology, and the conflict of interest can be decreased while they deliver the technology to companies. However, advanced design from design-related universities is usually manufactured to real products. Generally, there are problems when performing university-industry co-operative projects(Fig.7), and these general problems become one of the reasons for not creating successful university-industry co-operative project.

Fig. 7 Problems in university-industry co-operative research<sup>vii</sup>

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there are differences in purposes for pursuing co-operation between university and industry.

lack of practical element on technology from universities when performing research and development.

lack of protection on confidential from corporations

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lack of controlling good quality on research outputs  
rigidities on using budget for government driven tasks  
lack of reflecting demands of industry in university curriculums  
lack of information on the capability university and manpower  
lack of incentives on university, industry, and institute co-operative projects  
increase on task responsibility and insufficient preparation within corporation  
technological gap between universities and industries  
education and scientific research is focused, but social service and contribution is comparably ignored.  
there is no coordinator who can mediate the field of university, industry, and institute

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We also experienced the basic difficulties, and tried to overcome difficulties with new trials while setting up the same objective with industry and university. With unified objective, we tried to create effective project management through composition of complex organization which contained two axis. Also Idea Matrix is considered to be successful result on project management which was formed with new ideas with brainstorming. And this can be the success on management for improving efficiency on utilizing the capability of researchers, graduate students, and undergraduate students who are comparably not experienced.

With the result of this project Lotte Aluminum was able to manufacture 12 new package products. More important factor for Lotte Aluminum is that design's contribution for creating profit to companies was recognized and experienced to the members of the company. And they still are very interested in participating design process through Idea Matrix, and consider their management in the future with the application of design management. Though manufactured design wasn't able to improve material technology of the package, design was able to improve technology while mixing the material and changing manufacturing method.

<sup>i</sup> <http://www.lotteal.co.kr>

<sup>ii</sup> Key Aspects of the Production Process Life Cycle

Stage of Development	Relevant Characteristics
Fluid	Rapid, frequent product changes; product diversity
Transitional	Emergence of a dominant product design; maturing product group; process specialization
Specific	Emergence of a dominant process design; integrated automated process technology; reliance on suppliers' technology

Link, Albert N, Cooperative research in U.S. manufacturing, Lexington Books, 1989, 11p

<sup>iii</sup> <http://www.amcor.com>

<sup>iv</sup> Dai Nippon Printing Co., Ltd. [www.dnp.co.jp](http://www.dnp.co.jp)

<sup>v</sup> Nam, Jang-geun, The suggestion and mechanisms of industry, university, and research institute cooperation, Korea Institute for Industrial Economics & Trade, 2007, 33p

<sup>vi</sup> *Project Generalization Director* Yeong Mog Park (Professor, Seoul National University), *Advisor* Deuk Su Kim (Professor, Department of Packaging, Yonsei University), *Project Manager* Chang Won Seo (Senior researcher, KDRI), *Project Director* Seung Yoon Lee (Senior researcher, KDRI), *Senior Designer* Ji Hong Kim, Hye Jin Jang, Seung Min Kim, Sa Chun Ryu(Graduate and Doctorial course students, Seoul National University), Ju young Lee (Researcher, KDRI), Min Kyung Jo, So Young Park, Soo Yeon Seo (Master's course, Yonsei University, *Junior Designer* Hee eun Kang, Mi Young Kim, So Yun An, Jung Yun Yang, Ji Won Hu, Hyo Jin Kim, Man Jin Park, Ji Hye Jun, Hong Suk Choe, Seung Hui ,Ha Young Ku, Wook Yang, Sung Eun Kim, Hyeong Suk Kim, Bong Jun Kim(Undergraduate Student, Seoul National University), Kim (Keimyung University), Eun Mi O (Ulsan University), Chul Woo Jung, Ju Hyun Hwang (Kyung Book University) (Seoul National University 2rd)

<sup>vii</sup> Nam, Jang-geun, The suggestion and mechanisms of industry, university, and research institute cooperation, Korea Institute for Industrial Economics & Trade, 2007, 33p