Appendix for Chapter 6: Cases for the Judgmental Thread of Experience

The judgmental locus of causality has two loci, the result-oriented and the process-oriented. Each locus has internal and external cases resulting in 2x2 individual cells for both loci as shown in table 1. Each cell has representative products and services, which are either in the position of a dominant design or are predicted to become one.

Eight cases are studied in depth through case studies to investigate the UX factors that led to the success of each product or service along with the design features that make up each UX factor.

**[Table 1] Eight cases used in the case study for the judgmental thread of experience**

|  |  |  |
| --- | --- | --- |
| **Product / Service** | **Hedonistic**  **(Internal)** | **Utilitarian**  **(External)** |
| **Automation**  **(External)** | Product: Philips HUE  Service: Beat | Product: LG Roboking  Service: Minwon 24 |
| **Autonomy**  **(Internal)** | Product: Tamiya RC Car Porsche 934 Turbo RSR  Service: I Love Coffee | Product: Aimsak AD 418R, 18V Rechargeable Driver Drill Service: Easy Taxi |

The case studies for the eight examples were conducted through two-phases of research as was explained in the Appendix for Chapter 5. By meticulously analyzing these cases, we drew out the significant UX factors and design features of the product or service.

## 1. I Love Coffee

**A service case with internal results and an internal process**

(<http://www.patigames.com/>)

"I Love Coffee," a mobile Social Network Game (SNG), achieved sales of 0.1 million USD in just three days after its launch in 2012. The game was awarded for the best Korean mobile app in October 2012. Given that a mobile game has only 34% survival rate within its first day of being launched, achieving this amount of sales was a great success. After its huge success in Korea, the game was released in Taiwan, China, and Japan. It was also successful in China, enough so that a copycat was made, "Coffee Lover.” Most notable is that the popularity of game started from when it was launched as a mobile game. It had previously been released as a web-based game but didn't earn much attention then. After changing the platform from PC to mobile, it started to gain more users. To this end, "I love coffee" can be an example of a dominant design of a mobile SNG.

The game is designed based on the experience of the head of PATI Games Corp., the company that produces "I love coffee", from when he actually managed a real coffee shop in Korea. Maybe his experience helped him to consider each and every detail in the game very carefully to make the virtual operation as real as possible. Users can decorate not only the interior of a coffee shop but also its exterior. With respect to the interior design a user can decide on the color of each shelve and what wallpaper be used and where to place all decorative items. And they can even choose the scene of the street or the neighborhood in which the shop is placed. The player can make a cup of coffee for its customers and can for example tilt the smartphone to mimic the action of pouring milk into a coffee cup (as shown in Figure 1) or decide the amount of ice and topping for a given order. As the player's level goes up, the quality and complexity of the coffee ordered at the café increases. The player must pass a test to move on to the next level, and the test is to make a randomly ordered coffee within a given time frame. The time frame provided in each test shortens as the player's level goes higher, therefore a swift and an accurate control skill is required.

As described above, players of "I Love Coffee" can have fun by running their own coffee shops virtually. Apart from decorating the coffee shop based on one's taste, the game also supports social functions so that a player can visit friends' coffee shops and help them decorate their shops. And for example, only friends can revive burned coffee beans. Or the player can get insights about the decorations by visiting friends' shops. Serendipitous happening in the play is also another fun factor of "I Love Coffee." Randomly created quests are sometimes given to the players, and if the players succeed in completing the quest, they are awarded with rare items that can enhance their presence in the game. For an unused game item, a player can exchange it for another randomly selected item. The game company often holds decoration contests to encourage players to receive achievements. The players also often share their coffee shops through social network sites or blogs. Most people earn hedonic value from the process, and therefore the results oriented locus of causality is internal.

In terms of the process-oriented locus of causality, "I Love Coffee" presents highly intrinsic characteristics. First of all, "I Love Coffee" does not have any fixed ending. Even though there are quests at each level to be completed, these are not essential for the game play. A player has the full control over the menu selection and the opening hours of the coffee shop. Therefore, a player may feel a high sense of control throughout the entire gameplay. Since a player has a control over almost everything in the game and his/her actions are directly reflected to the game, the process-oriented locus of causality can be said to be internal.

[Figure 1] The capture of a scene from "I Love Coffee" pouring milk by tilting a smartphone. (Courtesy of PATI Games Corp., used with permission)

## 2. Tamiya RC Car Porsche 934 Turbo RSR

**A product case with internal results and an internal process (modelkits123.com.au/)**

Founded in 1948, Japanese company Tamiya is the leading company in the world in prefabricated toys such as plastic model cars, airplanes, and tanks, as well as RC cars (controlled by a remote control) as shown in Figure 2. It has a global market share close to 70% and receives much recognition as the best brand amongst enthusiasts for its products. One of their flagship models is Tamiya's Porsche 934 Turbo RSR. Tamiya's Porsche 934 Turbo RSR was once selected as the company's most representative product for its commercial success throughout its 30 year history. The car can therefore be called a dominant design in the RC car market. This model is still playing an active part in a global RC car race, TAMIYA RC WORLD CHAMPIONSHIP, held every November in Shizuoka, Japan. Players who survived the continental preliminary contests after winning the national preliminary competitions can enter the race. It is fascinating to see the competitors control their cars that they have built to suit their own preferences.

It has been said that Tamiya actually bought a real Porsche 911 in order to fully understand its structure and reflect it into the company's product. Apparently, there are a number of ways to combine and assemble all of the parts of the model. Customers can customize their products by choosing each part to suit their own preferences. For example, a customer can select among various motors with different speed rates per minute, acceleration speed, and between an aluminum or a steel body frame. Even in the assembling process of the selected components, the user can adjust the strength of combination between the parts. When playing with the assembled car, the user can fully control it using a remote controller.

The users of Tamiya RC car can feel the joy and fun in playing with a complete RC car. The spectators of the World Championships, as well as the competitors, feel the tension and sense of challenges while watching the race. Moreover, RC cars are fun to assemble. Many people enjoy the process of building the cars, from choosing the right parts to constructing them and to the point they have a complete car ready. One of my friends still brags about his own Tamiya Porsche 934 Turbo RSR despite the fact that he is not as young as the majority of Tamiya's customers. In this whole process, people feel a lot of hedonic values, thus resulting in significantly intrinsic results-oriented locus of causality.

Process-oriented locus of causality of Tamiya RC car also has very intrinsic features. Unlike ready-made toy cars, Tamiya's customers can select all aspects of the final product, including components and colors, as previously described. The users also feel a high controllability through delicate manipulation supported for driving of RC cars given the state of circuit or the performance of given car. Overall, process-oriented locus of causality is internal, drawing on the fact that users can engage with the whole process of assembling components and controlling the finished car.



Figure 2. An example of RC car. (Courtesy of Tamiya, used with permission)

3. BEATPACKING COMPANY – BEAT

**A service case of internal results and an external process**

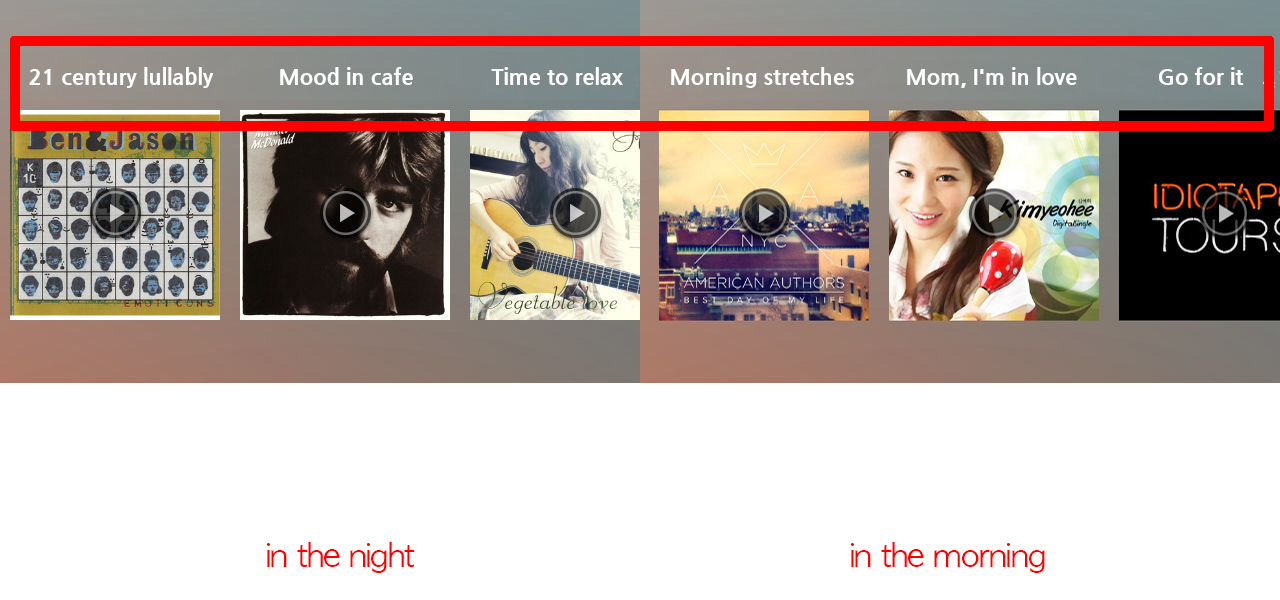
(<https://itunes.apple.com/kr/app/beat-music-player>):

Founded in April 2013, the Bit Packing Company is a domestic start-up developing the music player, BEAT, which suggests playlists to suit listener's taste. The company has been gaining attentions purely from word-of-mouth. Thanks to its popularity, the company has obtained a significant amount of investment from notable domestic venture capital firms in Korea. BEAT was introduced to the market after eight month development period. At first, its unfamiliar appearance and unstable service had negative impressions to its early users. But then, as streaming music service gained popularity along with the unlimited data service available to smartphone users, listeners started to take note of BEAT. From then, the player began proving its real worth. BEAT has adapted social networking functions, which were regarded as the prerequisites of successful applications. Through these functions, listeners can encounter new trends of music through the suggestions made by BEAT. Drawing on the fact that BEAT introduced the social computing feature in music streaming player service and brought a new culture into the music industry, the player has the potential to become a dominant design in the pertinent service market.

The users of BEAT experience further joy using the service itself, as well as listening to the music. For example, a user who intends to listen to the music takes most of his time in looking through one's playlists and composing a new playlist. As shown in Figure 3, BEAT offers a playlist called ‘Mix’ comprising a list of songs and music pieces selected considering the dynamic context of the users. The user can select one among several Mix suggestions, and BEAT plays the music based on the playlist. Mix is chosen based on the music pieces favored at a certain time zone or a music genre. The naming of the Mix is also generated automatically but takes user-friendly names. As a result, users show rather high satisfaction over the Mix suggestions, sometimes even higher than what they expected.

Mix itself is the major hedonic factor provided by BEAT. In particular, Mix tends to insert unexpected choices of music in its suggestions of playlists. This brings a lot of serendipitous fun to the listeners, and is thought to be the differentiation of BEAT from other similar services. Not only that, each song and piece of music can be shared through social network services, allowing users to share their listening moments with their friends. Some users specifically point this specific function of Mix to be the major reason of using BEAT. I have a friend who loves listening to music and is always looking for new playlists. After using BEAT I could recommend several playlists that might suit his taste based on BEAT's suggestions. As such, there is so much fun and excitement in the process of selecting a Mix as well as listening to the music through BEAT. People feel a lot of hedonic values, thus resulting in significantly intrinsic results-oriented locus of causality.

BEAT also displays highly extrinsic features in terms of process-oriented locus of causality. While most smartphone music players provide various functions of playing downloaded music or streamed music only, BEAT minimizes the involvement of users by providing a final playlist for the users without variety of choices. Although music recommendation features can be found in other music players, their recommendations are usually based on similar music and/or albums by the same artist. BEAT specializes itself by recommending different songs across the similar mood or contextual environment. Listeners leave the musical selection entirely to BEAT. As users will rely more on the recommendations by BEAT with the one being accustomed to the service, its process-oriented locus of causality is placed internal.

Figure 3: Examples of Mix configuration of the BEAT

4. Philips Hue

**A product case with internal results and external process**

([www.newscenter.philips.com](http://www.newscenter.philips.com)**)**

Gerald Phillips founded Philips around Eindhoven in the Netherlands in 1891. Philips started off as a lamp manufacturer. The company grew into a global corporation with its focus on consumer electronics, healthcare, and lighting as its core business. Now the company is working in a variety of lighting products and solutions ranging across the production of carbon-filament lighting, components of lightings, lamps, professional lighting, luminaires for consumers, and automotive lighting. As the world's leading brand of global illumination (16% worldwide market share), Philips provides a variety of products and solutions in almost all areas related to lights including home, office, retail space, roads, urban landscape, sport, stage, industrial, and automotive.

Hue, a smart light bulb made by Philips, is a combination of LED lighting technology and IT technology, and is capable of expressing various colors of light fixtures to suit the customers' needs and moods. With the emerging issue of incandescent light regarding its influence to environmental pollution, LED light market is rocketing as a more efficient alternative to incandescent light. In this sense, Hue is estimated to produce huge added value in energy saving due to its automatic sensor-based flickering. Hue is considered for the dominant design because of its outstanding market share in the LED light market.

After installing its application to either smartphone or a tablet, Philips Hue automatically adjusts the color and brightness by searching a unique bridge. Hue can represent 16 million colors with three primary colored LED that is adjustable into 256 different levels. And Light Recipes supported by the application automatically set the indoor environment to be suitable for 'reading' or 'watching a movie.' For instance, if one wants to change the color of Hue at home into the glow of sunset represented in a photo taken around sunset, he/she just needs to turn on the application and open the photo within the application. Then, the Hue application will detect the tone of the photo and reflect it in the lighting at home.

The Hue can be interlocked with other applications and has a variety of additional features. Aside from the original function of lighting, it functions as an alarm that notifies the news for example. The Hue is pre-planned to color blue when it is rainy using IFTTT (https://ifttt.com), an automated application. Users can customize it by using custom-made automation commands to fit their lifestyles. Every user of Hue can share his or hers own usage of the Hue to a website (http://meethue.com/). Users can even make uses of different color combinations or automation commands uploaded on the site. Everyone can upload his or hers own theme. Some of the themes contain how to create a creative lighting using several Hue lamps such as a rainbow lighting or the color of Macaroons.

During the Brazil World Cup, Philips introduced a special application, the Hue World Cup. The application can express the feelings of tension and joy or anger when watching a soccer game through the variety of lighting effects of the Hue. When you select a country, the lighting reflects the colors of that country's national flags. In addition, when you play a national anthem of a country, the colors of the Hue alter according to the rhythm of the anthem. For example, if you select South Korea, the Hue plays the national anthem of South Korea and changes its colors into red, blue, and white - the main colors of the national flag. Users feel joy and fun in this process. As they may feel much hedonic value, the locus of results-oriented causality is left internal.

On the other hand, the Phillips Hue presents extrinsic characteristics in terms of process-oriented locus of causality. The Hue does not need continuous control once the initial settings of pre-installed bridges are fixed upon its embarkation. Traditional light bulbs need to manually turn on and off upon the user's need, but the Hue does it by itself based on users’ usage patterns. For example, the Hue can detect that the user is on the way home using GeoFencing technology and turn itself on when the user is within a certain distance from the home. In contrast, when the user moves out the detectable distance, it is automatically switched off. Falling asleep while reading a book does not matter at all with the Hue. After the elapse of certain time, Hue turns itself off, and on again at a predetermined time to wake up. This way, the Hue follows the life pattern of its users naturally without additional control after initial settings. This results in low controllability to the users. Therefore, a user comes to feel that the Hue does everything well without the user's control, and the process-oriented locus of causality becomes external.

5. Easy Taxi

**A service case with external results and an internal process**

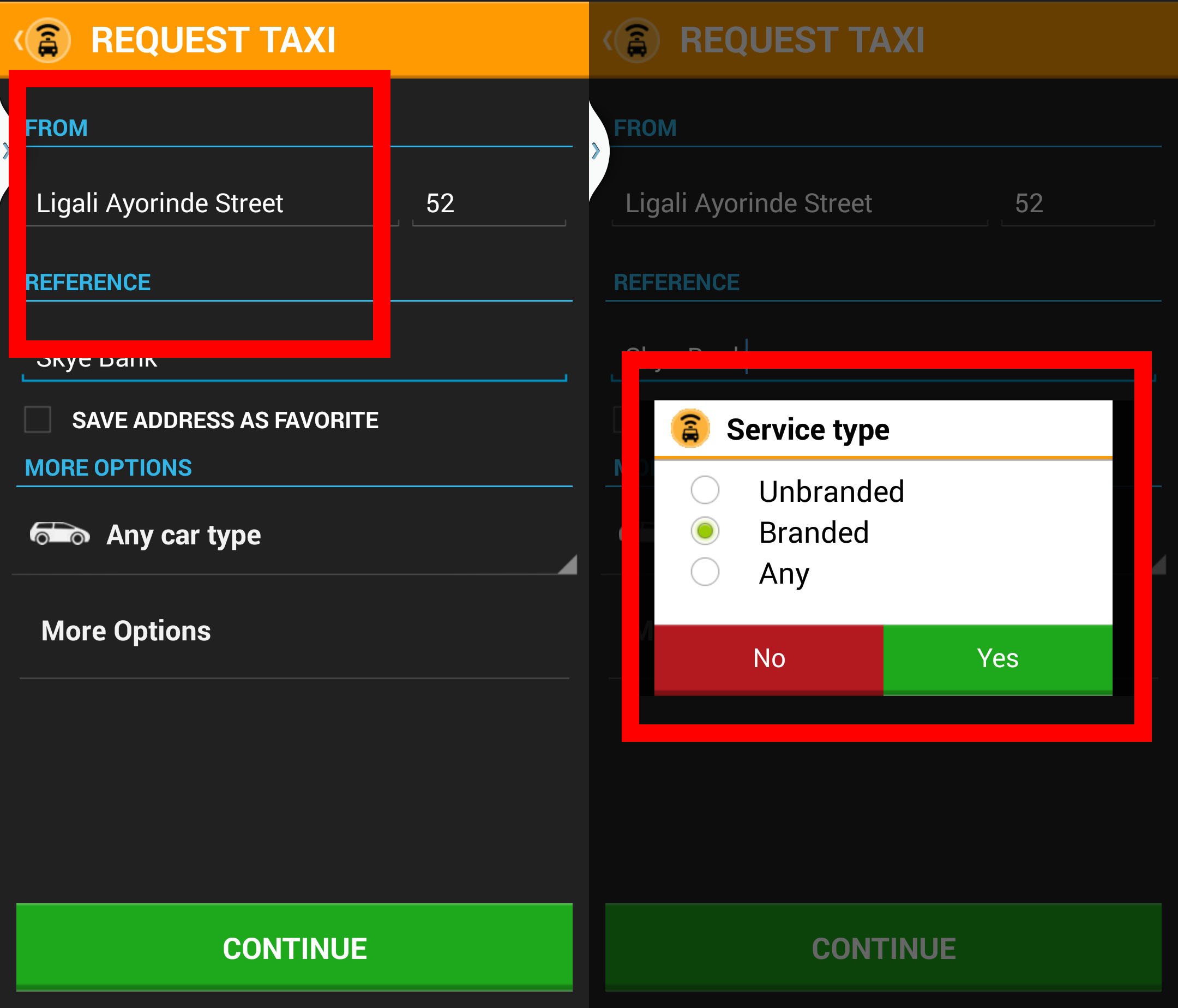
**(**<http://www.easytaxi.com>**)**

EasyTaxi is a call taxi service application developed by Tallis Gomex in Brazil. Now EasyTaxi has expanded its service to 100 cities in 30 countries across South America, Asia, Middle East, and Africa. EasyTaxi Korea was established since October 2012. With the dominant market share of 99%, the number of drivers using EasyTaxi counts up to 150,000 and the number of users are approximately six million. Currently it is serviced in the Korean cities of Seoul, Gyeonggi, Incheon, Gwangju, and Yeosu, and scheduled to launch the service in other major cities. Awarded as the best mobile system from Europe and South America, EasyTaxi was selected to be the best innovative company & brand of 2014, solidifying its position as a dominant design of the call taxi application for smartphones.

EasyTaxi utilizes a location-based service. Both the drivers and the passengers need to install the app to their smartphones, and the closest driver is matched to a passenger who called for the service. The biggest difference is that there is no human broker to match the demands of passengers and the drivers. Therefore, as shown in Figure 4, the passenger can control everything just by running the app without the hassle of explaining one's location and destination. One can instantly find out how many taxis are around, which taxi got the call and who the driver is. Instead of knowing approximate time span for the taxi to arrive, the user of EasyTaxi can identify the current location of the taxi on a map through the app. This is the biggest advantage of EasyTaxi over traditional call taxi service - enabling quick and reliable call taxi service.

A user feels that the app is useful when arriving at the destination. A number of reviews about EasyTaxi recommend the service for its safety. The app records very detailed information about every call as well as showing it to the users. For example, the app provides and records the information about the assigned taxi (name of the driver, his contact, car type, car ID). Furthermore, both the driver and the passenger must be registered to the service to use it. Even though someone does not know his/her location at that time, the app searches the exact address for the passenger using GPS. Even the first time a user can easily use the app since it offers tutorial service. Since general procedures of calling a taxi in EasyTaxi is similar to the traditional method, the experience of using the app is consistent with other similar apps. Thus, users can easily and quickly call a taxi without being confused of how to use the service. In this sense, users of EasyTaxi feels utilitarian value in the service, thus the results-oriented locus of causality is external.

EasyTaxi, however, has internal process-oriented locus of causality. Since a user and a taxi driver is matched 1 on 1 directly, the user can express one's opinion clearly to the driver. In particular, a user can mark specific location on the map and deliver it to drivers, adjusting the arrival point and destination in detail as shown in Figure 4. Once matched, a driver is supposed to call the passenger. The passenger can also call the driver for example if the pick-up point should be changed. The passenger can also control such details before calling a taxi by using the application, to explain to what building the pick-up location is near, further detail the destination or route, if a normal taxi or a larger-size taxi is needed, etc. Consequently, the process-orineted aspects of EasyTaxi service are at internal locus of causality.



[Figure 4] Call screen of EasyTaxi application (Courtesy of EasyTaxi Korea, used with permission)

6. AD 418R, 18V Rechargeable Driver Drill

**A product case with external results and an internal process**

**(**<http://www.aimsak.com/>**)**

AIMSAK is a Korean company that makes machine tools like rechargeable AC powered industrial drills under the motto of "Korean machine tools used worldwide." In the domestic machine tools market, it has the second largest market share of 10%, only after Bosch. It exports its products mostly to Asian markets such as Japan, Taiwan, Hong Kong, and Malaysia but also to Europe to countries such as Sweden and Finland. Conventional rechargeable power tools had disadvantages of less power and shorter uptime than wired tools. But when they started to be equipped with lithium-ion batteries, the share of rechargeable power tools increased to more than 80% of the power tool market. A small and light rechargeable driver drill is mainly used for repairing works at home or at the office. And with the rise of the DIY (do it yourself) movement, in which people reform and refurbish old furniture for example such tools, that are simple in use, are becoming more popular with unskilled people.

The flagship product of AIMSAK is the 418 series of electric driver tools that have a built-in battery for 18V. This product, the 418 series, has improved and is more light-weighted and more powerful than its predecessors. The product today has all the qualities needed to become a dominant design in its field, in Asia. One of the reasons why AIMSAK receives favorable reviews from its users is because the product advocates itself to be the custom Asian power tools. AIMSAK has stated that "The existing power tools from foreign brands are designed for Westerners with large hands and strong muscle strength. This makes it difficult to be used by Asians." And it further states that "AIMSAK's products are tailored to fit the physical characteristics of Asians, thus are safe and efficient for all sorts of works."

A rechargeable driver may perform the same operation with less labor on the human end. Especially compared to hand drills solely depending on the manipulation by users, the outcome quality of work is much more consistent as long as the mode of machine doesn’t change during the usage. Also there is no need for extra lighting since the lighting is embedded into the tool. Adding to that, users do not have to bring multiple chargers because there is one universal charger compatible with the chargers for all the other products as shown in Figure 5. Even the replacement of blades is now standardized. Different blades by different companies can be easily switched with each other as long as the size and shape match. Users feel the value of the product not in the experience of using the product itself but in the utilitarian goal of making something for the work easier using the drill. While using rechargeable driver drills, people feel a lot of functional value, so the results-oriented locus of causality is external.

In contrast, the process-oriented locus of causality of AIMSAK 418 series is internal. This is because one can adjust at will the performance of the machine to suit the job at hand. A user can choose between a work or a safe mode and choose the sense of rotation with a one-touch button as well as adjust the power of the drill. Also, the pressing power on the one-touch button corresponds to the power of rotation of the drill allowing users to intuitively control the speed of the drill. Usually rechargeable driver drills are much easier to use as long as one cares about the safety. The sense of achievements in the work process using the drills is enough to attract users into the world of DIY. Overall, the process-oriented locus of causality is internal, and they feel that they are in charge.

[Figure 5] AIMSAK electric power tools

(Courtesy of Aimsak Drill, used with permission)



7. E-Government Portal Minwon 24

**A service case with external results and an external process**

(<http://www.minwon.go.kr/>)**:**

Minwon 24 is a leading e-government service initiated as a project to establish people-oriented innovative civil service in 2000 in Korea. The categories of civil works covered by the service are as follows: the application, view, and issue of civil affairs documents. Specifically, the service handles vast amount of administrative works including guiding among 5,000 types of law court related civil affairs documents, receiving applications of 3,000 different types, and opening and issuing 1,200 types of documents.

Every 23 June marks the day of the UN Public Administration day. The object of UN's Public Administration Forum lies in supporting the administrative advancement in developing countries and encouraging innovations in public administration by sharing advanced administration systems from various nations. Korea was ranked at the first place with respect to the e-government evaluation by the Forum three times: 2010, 2012, and 2014. Minwon 24 was one of the major reasons behind the first rank, allowing integrative and convenient civil affair service. Adopting Minwon 24 was estimated to create a huge social cost reduction up to the size of USD 1.4 billion. Also it earns several millions of dollars from its exportation. Drawing on this situation, Minwon 24 is enough to be considered as a dominant design in e-government service.

Various types of works, such as identifying personal Information and confirming the requirements to file a civil complaint, should be followed in the work of civil affairs. The amount of work, however, is not explicitly visible in Minwon 24 since they are handled in the backend of the system. For example, let's take the case of issuing a social identification card. Certification program approves to enter the process only after matching one's login information from the database for the previously registered personal information. The user simply selects the issuing option and the system of Minwon 24 automatically takes all the procedures needed to issue an identification card based on the personal information managed by the government. Sometimes additional information is required for newly added administrative procedure or previously unstated information, but it is kept to a minimum. In terms of the information security issue, the security programs are implemented at the system to monitor every step for any information leak or fraud. When all processing is complete, even the printout of the processed document is inspected by the system as a prevention of possible vulnerabilities in using publicly shared printer or any other printing machines. Most of the process undergoes behind the visible wall of Minwon 24 so that users do not need to notice nor care the micro-steps of the administration. In this aspect, Minwon 24 tried its best to automate the process and thus minimize the unnecessary burdens on the user's end.

The goal of Minwon 24 is fairly practical. The system offers more convenient service online than that of offline yet still the quality and variety of the services remain the same. For example, people need to printout dozens copies of resident registration each time in order to apply for jobs in most companies. If one considers going to a graduate school, the types of documents even vary with all the necessary forms needed to fill out for a student loan. Literally, one's desk often becomes like the one at a community center. All these steps are boring but essential to prove one's social status in diverse aspects. Using the Minwon 24 makes the process much easier and efficient. People are not interested in the process of issuing all the documents, but they need these documents to apply for something else. Therefore, the results-oriented locus of causality of using Minwon 24 is external.

Process-oriented locus of causality of Minwon 24 is also highly external. Most of the websites ask users to choose one option of preference at every step in a whole process. As a result, total number of option buttons and steps increases. However, users of Minwon 24 fully delegate their authorities to the system in order to use the online service, thereby the number of choices that should be made by users can be kept at a minimum level. Therefore users feel that the system of Minwon 24 takes over the needed control. And Minwon 24's process-oriented locus of causality is external.

8. LG Robot Vacuum Cleaner – Roboking

**A product case with external results and an external process**

**:** (cyking.lge.co.kr)

LG is the largest domestic manufacturer of robot vacuum cleaners in Korea. The company has never missed the lead since it first introduced its robot vacuum cleaner in 2003. This is because the company continues its research and development of robot cleaner-related technology. For example, the company first adopted a dual top/bottom camera to its robot cleaners in 2009 in order to reduce the cumbersomeness of cleaning. The dual camera enables the robot to automatically plan its optimal paths for its cleaning job. This technology received good reviews worldwide as an innovative technology for a smart home appliance and resulted in LG gaining a worldwide lead in the robot cleaner market. Especially the VR630X series by LG RoboKing, showed in Figure 6, has improved the efficiency of cleaning corners by introducing a cleaning mode capable of both dirt suction and wiping, automatic leaning mode, and an unprecedented rectangular design. In general, the series are thought to overcome the classic problems of robot vacuum cleaners, such as noise, incapability of cleaning corners due to its round shape, and unreliable automatic cleaning mode.

Through numerous trial-and-errors, the series now holds high trust for its automatic cleaning mode and has a good reputation with the improved usability. Products with copycat design and technology of LG's RoboKing have flooded the market afterwards, corroborating that LG's RoboKing has a dominant design position in the market.

LG has been committed in developing as automated cleaning mode as possible and minimizing its noise to 48dB. Through those efforts, the company offers not only the excellent cleaning performance but also convenience. Actual users of the LG RoboKing products praise the company's efforts in alleviating the chores of everyday life to be more comfortable. Recently, LG has been enhancing the usefulness of its product lines by applying NFC technology and specialized smartphone applications. Users can benefit from the adoption of such technology and enjoy more of their spare time, leaving their time and labors for cleaning to robotic cleaners. Even the robot cleaner selectively applies specific cleaning techniques upon different situations such as cleaning carpet or wooden floors. People can also identify the status and situation of the robot cleaners at a glance, being assured of its cleaning progress.

In fact, the key benefit of the robot cleaners simply lies in its usefulness. The convenience of robot cleaners is so obvious. LG RoboKing, in particular, provides a user experience that allows remote control via smartphone apps instead of proprietary remote controls. For example, a user can operate and check the robot cleaner remotely using a smartphone app, in which the interface resembles that of the robot cleaner, without needing to hold a remote control. We could experience the practicality and usefulness of robot cleaners from this consistent user experience. Through these utilitarian values, the results-oriented locus of causality is highly external.

In addition, the robot vacuum cleaner portrays highly extrinsic characteristics in terms of process-oriented locus of causality. Ordinary vacuum cleaners require users to take the control. From switching it on and off, to washing the machine afterwards, users do all that work. If the cleaners are rechargeable, users should do the charging as well. However, it gets much simpler with LG's robot vacuum cleaner - users only turn the cleaner on or off, then the cleaner does all the work automatically. It coordinates its paths and cleans along the given path. No intervention or control is required on the user's end in this process. All procedures are automatically controlled and operated by a robot cleaner, not the user, and the cleaner even charges itself. Once the robot cleaner almost reaches the end of its battery life it discontinues its work and moves to the nearest charging station. When it is fully charged, it gets back to the previously unfinished work. Since users delegate their duty of cleaning to the robot cleaner, the process-oriented locus of causality is highly external.

[Figure 6] Robot Vacuum Cleaner (Courtesy of LG, used with permission)