

# The case study of the result, considerations and management in the autonomous system in mountain and coastal area

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## 1. Background

The autonomous driving is raising significant attention and being developed globally as a next generation car. If judged by current speed in the development, most of the auto vehicle companies would bring their products into the market by 2022, and by 2025 almost all of the auto vehicle makers would have their autonomous driving cars. Surely this will have an impact of the conventional way the laws and insurance businesses operate. Until today, the auto vehicles have been put into market after the rules regarding laws and the insurance are decided, and then the rules are adopted and improved based on the experiences. However, the autonomous driving will be a whole new product standardized and brought into the market without being adoption or adjustment with laws and insurance. And this implies the impact of this new invention will be completely different compared to the conventional one until now.

The conventional auto vehicles are what we see running in high-ways or communities. Simply the changes we see are what naturally take place in the evolution of auto vehicles. In an extreme way, we say that the conventional product is something which moves forward with 4 wheels pushing against the resistance of the road surface with certain speed.

This paper deals with a situation in which we try to apply the auto vehicle system without AIS ( Automatic Identification System ) function equipped to a smaller size boat with the purpose of expanding the utility into commercial use. In this paper we also summarize the way of the management of new technology in terms of how to obtain it and how to bring it into production.

2. Regions slipped out of the vision of the auto vehicle manufacturers and the condition of the usage

The autonomous driving equipped vehicles generally run on the roads which are equipped or prepared for such uses and run within a prescribed area. And they are not developed to run in off-road conditions. Especially a condition different to the road surface resistance to 4 wheels is out of the scope of the study of autonomous driving. We assume that the autonomous driving concept is originated from the thinking of auto control of the vehicle when it starts to slip in a snow-covered road by automatically stopping the vehicle from running.

Basically the conditions or circumstances which are not considered so far by auto vehicle manufacturers are the mountain roads, coasts, roads in severe condition, and wet roads. As an example, it can be a road in a tourist spot where the vehicles cannot run and so people have to walk on their feet. You could also imagine a golf-court where the cart cannot run.



3. Security considerations and the real needs of users (or market), and an image (picture)

The assumption of the security in autonomous driving in this paper is that the vehicle stops automatically in order to protect the pedestrians, and the assumption of the needs of customer is that the autonomous driving gives a good consideration to the users who are mainly the older people walking slowly while enjoying the scene in the tourist spot. The example in the image is an scene of a motion picture with a boat in the photo but the requirement for the safety is the highest possible.

Make for the elderly to enjoy nature < Oze in Japan >



Make for the elderly to enjoy resort < Krabi in Thailand >



For unpaved road



Image is an scene of a motion picture





A boat in a tourist spot is, as shown in the picture, very close to the people in distance, but the propeller shaft is not equipped with safety equipment and is very dangerous.



When the size of the boat is bigger, there could be 2 person controlling the boat on top of the crew. But this is the minimal measurement against the requirement for the safety. However, increasing the number of the crew does not mean the safety, and this is one of the characteristics of the boat as a mean of transportation.

#### 4. The processes required by the commercialization and the profit planning.

First, we have studied if the core technology exists in Japan. The core technology is based in the USA, Europe, UK, but in order to confirm the status in Japan, we must start with the origin of information. We have investigated if the information is available in companies or government organizations or universities. The investigation has many difficulties and problems, for example the disclosure of information is depending on who you are or the size of your company, who should be the window person for the communication for you to obtain the information, and also depending on the timing of your action. Also the key person of the organization which you request for disclosure of information is an important factor. We have made preparation in consideration of all of these factors since 2014 and started the study in 2016. We also must decide on the final purpose of the plan.

Finally in February of 2017, we have succeeded in putting a laboratory in an university for information collection, and now have already obtained significant amount of information.

In the process of commercialization, we must be able to estimate the profit and the cost in this preparatory phase based on our experience in auto industry. We have created our estimation of the sales price which is considered as the most competitive based on the existing vehicle models. And from this sales price we try to make reverse calculation to obtain the cost with our best team of young engineers until in May of 2017.

The process following above will be the search of partners. We consider we need 2 of such partner companies, and the companies must be able to produce the final product.

#### 5. The short term study with a team of young global human resource

Traditionally in Japan, the young students are first educated until they become

professionals. But the study we conduct is on a global scale requiring the staff to be able to do the work of information collection, analysis, and commercialization all in English, therefore we could not follow the traditional way in our case, and requested for people like the people in US and Europe, and our requirement is that they have technical knowledge as well as business with MBA background. We educated them in the first 2 years and they joined the work in the 3<sup>rd</sup> year as practice. As a result we could complete the information collection in 1 and half year after our actual start of work.

We consider this should be the way of the development of a technical product should be. We are planning to reduce the number of the project members to 2 dividing the job into technical development and others and preserve the speed of the progress. And we will reduce the development cost by outsourcing the base work by BPO.

#### 6. The state of autonomous driving required in current time

We hoped to do our study based on information collected in Japan, but the reality is that the study in Japan is only limited to a few large companies, and does not seem to catch up 2022.

The autonomous driving can be divided into 3 fields, and we wish in our future work we can work based on Japanese technology but it is largely dependent on the availability of universities given the chance to join the program.