

How to establish the ways of human labor such as risk management and the measure of human error in technological innovations such as big data, AI, and IoT by open innovation

By Toshiyuki Murai (JRUI)

1. Introduction

I am going to talk about the ways of human labor upon the systematization of risk management and human error measure through technological innovations such as Big Data, AI, and/or IoT by open innovation.

First, I would like to introduce you to the Morioka Shinkansen Transport Ward where I work. The workplace is composed of 175 employees including 63 conductors, 87 train drivers, and 25 office workers.

The routes take one starts at Morioka and terminates at Shin-Aomori, another one starts at Morioka and terminates at Akita, and the one covers between Morioka and Tokyo.

The vehicle models include E5 series and E6, which can get up to a speed of 320km per hour, and there are a conductor and a driver onboard, transporting about 1,000 passengers in a single trip.

2. About the Shinkansen operation

The Shinkansen refers to a train that travels at a high speed of 200km per hour or faster, and its track uses a high-speed dedicated viaduct to enable high speed operation. Therefore, it is more punctual than regular trains and superior in terms of safety.

The main task of the Shinkansen drivers is to calculate speed from distance to the next station and the time, and tries on-time operation. Also, through daily experiences and regular training, drivers polish their skills to back up the system in times of abnormal situations and/ or to repair vehicle failures.

Conductors are onboard assisting drivers to deliver passengers to destinations safe and comfortable. In case of in-vehicle troubles and/ or abnormal situations, they are directly going to the scene to support the passengers immediately at the same time handling the vehicle problems. They are trained to make judgement of the situations from the daily work experience and training. They are just like the drivers refining their skills in proportion to the experience so that they can make their passengers more comfortable while transporting to the destination.

3. The major differences between the Shinkansen and other conventional trains

Now, I am going to explain the major differences between the Shinkansen operation and other conventional train operations. Because the Shinkansen runs on a viaduct for high-speed driving, where there are no level crossings and no entry of people or cars, the drivers are not obligated to look ahead all the time. When the driver needs to look ahead is the

time when the train enters and leaves the station. In addition, the Shinkansen system uses a signal safety device called Automatic Train Control (ATC) because of its special characteristics of high-speed running, which is difficult to check by ground signals. ATC is a safety device that automatically controls the operation speed of the train according to the distance to the train running ahead and the route, therefore, the major distinction would be that the system security is largely guaranteed over conventional lines.

4. What are the Japan's innovation and change that the Company aims for the crew's work?

Today, Japanese companies are promoting the introduction of MAAS in the transport sector based on Society 5.0, which is a concept of a future society advocated by Japan. JR East Company has proposed in its "JR East Group Management Vision 'Move up' 2027" that in order to divert cooperate resources from the railway business to the life service business while the labor force is only going to decline due to the declining of birthrate and aging population. In order to do so, the employee system needs to be changed from "training an employee to become a specialist of railway workers" to "training an employee to be able to handle a wide range of work, the generalist". And further down the road, the Company assumes the driverless system along with the automatic operation of the railway by technological innovation introducing new vehicles.

In this vision, the Company aims to strengthen their grasp of employees' personal information and by so doing tries to increase employees' productivity along with measures against unions. How do they do it? By renovating the crew's workplace into one floor and maintaining a management system to overlook the crew members even during the breaks. Furthermore, along with the reduction of human labor by technological innovation and systematization, the vision writes that the crew members working at the same job type up to 10 years are mandatorily transferred to a different section to do a different line of work.

In other words, the purpose of this vision is to create "multi-functional employees" instead of "experienced skilled workers". Because there is a risk that the employees will lose their pride for the job and the system is hard for them to envision the future of themselves in the Company, the long-term employees of railway sector have voiced anxiety and questions against this vision.

5. Expected issues

While we understand that the importance of the measures on the basis of economic situations, we believe that especially after AI and IoT are introduced in the workplace it is more necessary to nurture the quality of human labor for drivers and conductors who are responsible for the safety of passengers.

Generally speaking, system implementation makes human labor more efficient and increases productivity with less labor costs. However, in the case of crew members, if it is obligated to rotate job types with a shallow tenure, there may be a loss of sense of responsibility and professionalism and a risk that human crisis management ability will be greatly degraded by disruption of procedures due to one's inexperience or the interruption of information.

The true value of human labor lies in its ability to cope with abnormal situation. We have experienced through the Great East Japan Earthquake. While we had never experienced such disasters before, no one was killed or injured because we were able to make decisions that are not on the manual like stopping the train outside the tunnel, how to guide passengers in the Shinkansen sections where the distance between stations is long, and how to treat the sick based on our knowledge of geographical sense in the community from daily work experiences. As such, because our work is to transport humans to their destinations, the prerequisite for the safety transport is understanding the needs and wants of passengers and the experienced labor that allows judgement on a spot.

Such crisis management skills among the crew members have been nurtured by sharing each other's experience regularly so far. This style has been established because there is a work culture that one can talk about anything without pressure. However, the management policy that the Company is currently promoting sees the systematization is greater than human labor, which leads to a possibility that the peculiarity of the train crew diminishes and the sensitivity of human labor and ability to manage risks may be all deteriorated.

From now on, in order to promote this systematization, we must not lose crew workers who have worked many years at the workplace, and need training and education that ever more required to further develop the crew's ability to respond to risk onboard and experienced labor. However, what we see in the workplace is that comparing workers with the prescribed Company manual and if deviation occurs the person is punished for the incident, instead of receiving a deeper education about "human labor". The issues we can expect from here are not the matter of the response to the unexpected accident or prevention of the incidents, but a management style that replaces workers who made mistakes as broken products, and this anxiety of the workplace resulted in taking away workers' joy in the end, produce deterioration of the corporation quality. The major loss as a society is inevitable.

6. A policy-first measure is to create the workplace that pursues liability and a culture that denies human labor

On September 30, 2018, a driver of the Tohoku Shinkansen was struck with strong sleepiness after leaving the Sendai station, and passing at the Mizusawa-Esashi Station for 2 minutes delayed. The driver awoke at the call from the command center, but the driver was very upset and reported the reason why he got the train delayed as a "station trouble" and "incorrect calculation," which was an incorrect report. Then after he got calm down and came back to the ward, he corrected himself saying that he was sleeping in some section.

At the beginning of the outbreak, his section chief advised the driver to take a physical examination at the hospital in order to resume the job position. Then the driver was diagnosed with severe SAS (disease of sleep apnea syndrome) according to detailed physical examinations. Only then, the section chief accused the driver not because of the fact that he was asleep but that he did not immediately report the truth.

The Company forced its "logic of management" instead of investigating the real cause of the event. The driver was placed in-house-workshops because his quality as a member of the society was considered problematic and so he must refrain during the day while he was not allowed to be onboard. There he was not allowed to find

out the curriculum ahead of time, so he did not know what was going on. Then, the workshop instructor made harassing remarks like “You must say you are going to the bathroom when you go,” “You must sit here like you are the train driver” and “You can rely on the union, but you must know that you are an employee of this Company before the unionist.”

And on November 19, without any notice nor a particular reason, the section chief told the driver in a highly pressuring manner that he was not fit as a train driver. Then he was transferred to a station section.

7. Our Response

We had investigated the cause of this event as a labor union. And we reported that the SAS is a disease without noticeable symptoms and this kind of incidents can happen to anyone, thus the investigation of the real cause and a widely shared corporate flow of SAS are important. And we have asked for periodic medical checkups and some items such as the cycle and method of the Company’s simple medical checkup should be included in the medical aptitude test.

In addition, regarding the “correct report” that the Company sees as the issue, knowing the special characteristics of crew work that make it rather difficult to report correctly due to the sense of responsibility of tasks and the punitive workplace culture, we spoke up the ways in which human labor should be ideally managed at “the committee of workplace safety and health”.

However, even now, this issue has not been resolved, and we as crew members are worried about making mistakes and facing the extreme pressure that we will be forced to transfer if we make mistakes. Due to the pressures there have been more than 10 incidents resulted in human errors since last September. In the survey questionnaires we created for our crew members, 100% of the crews answered “forced transfer is pressured and the work place is not lively”. The fact is that a workplace culture that does not allow any mistakes only creates pressures, threatens the safety culture and takes away the pride of the crew members.

8. Proposal

I am going to propose two points from perspectives of how to nurture human resources that coexist with technological innovations such as AI and IoT.

The first point is to “establish an in-house management system that focuses on human labor”. Proportional to technological innovation and systematization in railways are manualizing of employee management, and then the severely-simplified management dealing with phenomena without digging down deeply on the nature of events and human beings. Because human being is to make mistakes, the management team refines the ability to learn from the accident, and through education based on investigation of the causes, the management system that knows human nature is established as a safety culture and supports systematization.

Also, as the International Labor Organization (ILO) adopts the first Convention of Violence and Harassment in the World of Work on June 20, Japanese companies are still major behind the global standards, the corporate culture that denies humanity also needs to be revised.

The second one is to “secure working conditions and training programs that improve the quality of human labor including crisis management”. Proportional to technological innovation and systematization in railways is the deterioration of workers’ sensibility due to simplification of human labor. From now on, in order to carry out the rotation including multi-functionalization of the crew because of the employment situation, the railway safety must be secured by all means. Therefore, what compensate for the deficiencies of the policy are a job choice with a sense of satisfaction on the premise of workers’ own wishes, in addition to enhancement and regularization of onboard trainings in order improve proficiency and safety, to establish a permanent employment system and seniority pay that guarantee the pride. Setting working conditions in which one can be proud and take responsibilities in his job will create reward for the workers and loyalty to the Company, and increase the productivity as the corporate culture of focusing on safety issues. This will lead to the establishment of management systems that can foster human resources and will not be hindered by its systematizations.

9. Conclusion

The JR East Company’s former advisor, Shuichiro Yamanouchi, once said in the book entitled “Why do Railway Accidents Occur?” using words of Kunio Yanagida and described the system and human labor as follows:

“Human is not a straight line. A safety system should be created on the assumption that humans do make mistakes, but I think it is better not to build too many extra systems. Human is able to respond to things appropriately by experiencing dangerous things upon some freedom. Paradoxically, it is more effective to have actual accident or failures than one hundred sermons. That said, major accidents certainly should not be occurred. It is my idea that such accidents that cause casualties in customers should be prevented by the system, but other things should be left to human responsibility as much as possible. ... (omission)... There is no end to safety management. And there should be a vision and the philosophy. Afterall, safety is a matter of top management.”

In Japan, the union membership is less than 17%. The need for unions is also questioned in the JR East Company. Human labor always exists even with the advancement of systematization and new technological innovation. The role played by the labor union has been to maintain the “safety, health, and comfort” in the workplace, and its practice has greatly supported Company’s safety and development. In considering the safety of railways, increasing the value of human labor leads to the developments of companies and the community. “No labor. No safety!” Safety issues are the responsibility of both labor and management. In order to cherish human beings and create a work environment and a cooperate culture in which workers can sense the values of labor, we will continue to challenge from the workplace.

Thank you so much.