

As this model shows, even as a person interacts with a machine within an environment, three activities take place between the system and the task to be performed. Every time a task must be performed, there is the risk that an accident may occur. Sometimes the risks are great; at other times, they are small. This is where information collection and decision making become necessary.

On the basis of the information that has been collected by observing and mentally noting the current circumstances, the person weighs the risks and decides whether to perform the task under existing circumstances. For example, an operator of a masonry saw is on a rush job that is behind schedule. An important safety device has malfunctioned on his machine. Simply taking it off will interrupt work for only five minutes, but it will also increase the probability of an accident. However, replacing it could take up to an hour. Should the operator remove the safety guard and proceed with the task or take the time to replace it? The operator and his supervisor may assess the situation (collect information), weigh the risks, and make a decision to proceed. If their information was right and their assessment of the risks accurate, the task will probably be accomplished without an accident.

However, the environment in which the operator is working is unusually hectic, and the pressure to complete a job that is already behind schedule is intense. These factors are **stressors** that can cloud the judgment of those collecting information, weighing risks, and making the decision. When stressors are introduced between points 1 and 3 in Figure 3-5, the likelihood of an accident increases.

For this reason, the following five factors should be considered before beginning the process of collecting information, weighing risks, and making a decision:

- Job requirements
- The workers' abilities and limitations
- The gain if the task is successfully accomplished
- The loss if the task is attempted but fails
- The loss if the task is not attempted.¹²

These factors can help a person achieve the proper perspective before collecting information, weighing risks, and making a decision. It is particularly important to consider these factors when stressors such as noise, time constraints, or pressure from a supervisor may tend to cloud one's judgment.

Systems Theory in Practice

Construction Service Company (CSC) makes customized trusses for residential construction jobs. CSC specializes in doing the types of work that other companies cannot or will not do. Most of CSC's work comes in the form of subcontracts from larger construction companies that have run into unforeseen framing problems. Consequently, living up to its reputation as a flexible, on-time company is important to CSC.

Because much of its work consists of small numbers of trusses, CSC still uses several manually operated machines. The least experienced employees operate these machines. This causes two problems. The first problem is that it is difficult for even experienced operators to make clean, accurate cuts on these old machines. Consequently, apprentices find operating the machines quite a challenge. The second problem is that the machines are so old that they frequently break down.

Complaints from apprentices about the old machines are common. However, their supervisors consider time on the old "ulcer makers" to be one of the rites of passage that upstart employees must endure. Their attitude is "we had to do it, so why shouldn't you?" This was where things stood at CSC when the company won the Johnson contract.

CSC's management team was ecstatic! Finally, they had an opportunity to partner with H. R. Johnson Company. If CSC could perform well on this one, even more lucrative contracts were sure to follow. The top managers called a company-wide meeting of all employees. Attendance was mandatory. The CEO explained the situation as follows:

We have a great opportunity to become a preferred subcontractor for the biggest, most successful construction company in the region. But first we have got to make 1,000 trusses, and since very few of them are alike, the automated machines won't help much. We are going to have to use the old machines. Everybody knows what is at stake here. I am counting on you to come through.

This put CSC's apprentices on the spot. If CSC did not perform on this contract, it would be their fault. They cursed their old machines, but got to work. Unfortunately, before long, the contract was behind schedule, and management was getting nervous. The situation was made even worse by the continual breakdowns and equipment failures. The harder supervisors pushed, the more stressed the employees and machines became.

Predictably, it was not long before safety procedures were forgotten, and unreasonable risks were being taken. The pressure from management, the inexperience of the apprentices, and the constant equipment failures finally took their toll. In a hurry to get back on schedule and fearing that his machine would break down again, an apprentice got careless and ran his hand into the saw blade. By the time the machine had been shut down, his hand was badly mutilated. In the aftershock of this accident, CSC was unable to meet the agreed-upon completion schedule. As a result, CSC did not make the kind of impression on H. R. Johnson's management team that it had hoped.

This accident can be explained by the systems theory. The *person-machine-environment* chain has a direct application in this case. The person involved was relatively inexperienced. The machines involved were old and prone to breakdown. The environment was especially stressful and pressure packed. These three factors, taken together, resulted in this serious and tragic accident.