Management Accounting – Decision Management

In the first of two articles, **Tim Thompson** introduces the case of a company that's facing a tricky short-term quality problem – and invites you to solve it.

AGJ is a company that manufactures a product called the Pool Heater and sells it to local authorities, country clubs and private householders. As its name suggests, this product is used to heat water in swimming pools. AGJ buys various components from suppliers and assembles these into the finished product. One of the company's key stated policies is its commitment to quality.

Each heater contains a critical part named component Y. It's company policy to procure all critical components from two separate suppliers and, when the company was formed, AGJ began obtaining component Y from both HKP and PQR.

Six months after AGJ was formed, HKP went out of business and immediately stopped supplying component Y. Fortunately, AGJ managed to obtain extra supplies from PQR and, as a result, was able to meet all of its customer demand. Later it found a new supplier, XYZ, to continue its dual-supplier policy.

About six months after HKP's failure, there was a board meeting at AGJ and the directors spent much time complimenting each other on how well they had managed the switch to the new supplier. They were particularly pleased that all of the stock originally supplied by HKP had been used in assembly, and that the associated Pool Heaters had all been sold. But a week later the firm was in turmoil. A former employee of HKP had blown the whistle, alerting AGJ to the following problems:

- Throughout the year before it went out of business, HKP had failed to inspect any of the component Y that it had made and sold. This was a cost-cutting measure taken when it was clear that the company was in financial difficulty.
- Before this cost-cutting exercise, HKP had inspected all such components and scrapped any that were deemed faulty. On average, three per cent were found to be faulty.
- The inspection was an industry-standard process, but it did not detect all faulty components. In common with the rest of the industry, 0.5 per cent of the components that were sent to customers still failed.

A further AGJ board meeting was immediately convened and the following extracts were recorded in the verbatim minutes:

Managing director: "This is a nightmare. If any of the heaters we have sold include a faulty component Y, we know that this will eventually cause a failure. We give a five-year guarantee on these products and we're committed to rectifying any faults that occur. I can't imagine the cost to us in terms of our damaged reputation, but we need to begin by knowing something about the costs of putting any failed heaters back into operation."

Technical director: "We already knew about the industry-standard failure rate of 0.5 per cent and were expecting this to arise for components supplied by both PQR and HKP. We have not yet had any component Y failures in the heaters that we have sold, but we anticipate that any failures that do occur will start happening in about three months' time."

Production director: "We don't inspect these components ourselves. This would be a non-value-added activity and we don't have the technology to conduct such inspections anyway. A 0.5 per cent failure rate is very low and we should be able to live with the consequences of any failures that do occur at this level."

Technical director: "If a component Y does fail, it will need to be replaced with a new one costing $100. But to do this would require an emergency visit by a service engineer. It would take an average of three hours to travel to and from the customer and make the repair. As you will recall, we have established that the opportunity cost of these engineers is $50 per hour. But the problem is not that simple. When a failure occurs, it's not only a matter of replacing the faulty component Y. These heaters have water running through them and, if the component fails, it will leak out and cause all sorts of damage to our customers' premises. We have previously researched this in some detail and we estimate that, on average, we would have to pay a further $500 for each component Y failure to clear up the mess and rectify the damage.

"Using Bayes's theorem, I should be able to calculate some expected values to determine the estimated costs of the alternative options"

"We already have in place detailed plans to deal with any such failures. The service engineer will identify whether it was HKP or PQR that supplied the faulty component and we will keep detailed records of all of the costs that we incur. With the guarantees provided by the suppliers, we expected to charge these costs in full back to the supplier. So, although we guarantee the product, it is the supplier, not us, that should pay for the fault and its consequences. The problem that we now have, of course, is that we cannot go back to HKP, since it has gone out of business. We will have to bear that cost ourselves and I am very worried that I will be held accountable in future for some significant adverse cost variances."

Sales and marketing director: "If the number of failed components is to be as great as we are now expecting, then

I agree that this will cost us even more in terms of our reputation – we could lose future sales as a result. I think that we should look at ways of eliminating, or at least minimising, this risk. Our engineers will visit all of our customers within the next three months to perform routine maintenance work on the heaters. At these visits, could we inspect the component Y in all of the heaters concerned? If we did this, we could replace any that are found to be faulty. With luck, we might complete this before any of the components fail."

Production director: "The greater risk clearly lies with the components supplied by HKP. Unfortunately, we don't keep records of which supplier's components were assembled into which heater. We won't know this information until we open the heaters up and see the component. What we do know is that we have assembled and sold a total of 4,000 heaters since we started the business. Our purchasing records show that, of the 4,000 of component Y that we purchased, 2,500 were obtained from HKP and 1,500 were obtained from PQR."

Finance director: "Performing these inspections during the routine maintenance visits would mean that there would be no extra travelling costs. The only relevant costs would be the purchase of replacement components for each one found to be faulty; the extra time that the engineers would need to spend on the inspection and replacement activities; and the cost of providing any testing equipment."

Technical director: "I have some figures here: replacing component Y is one of the standard operations for which our service engineers are trained. Each job should take 30 minutes. But, if we are going to conduct this inspection, we do need some special testing equipment. For a cost of $20,000 (in total, not per engineer), we can equip all our engineers with a device that can be taken on site to test component Y. If the component proves to be faulty, then it can be replaced. This test takes about 15 minutes for each heater. The devices are 100 per cent reliable and will detect all faulty components. This testing method would also detect those faulty components that we were planning to accept within the 0.5 per cent normal failure rate. It would ensure that any components that we use as on-site replacements are not faulty, either."

Finance director: "I think we're in a position to evaluate the alternatives that we face. We seem to have three choices here. We could take the passive approach, which means waiting for any failures to occur and dealing with them as they happen. Alternatively, there are two possible active approaches, both of which call for the engineers to inspect all of the heaters concerned and make replacements as required. The first of these would be to launch an immediate programme of special visits and the second would be to perform this activity at the routine maintenance visits. I think that the first key issue here is to determine how many of component Y we might reasonably expect to fail. We also need to determine the likelihood that, if a component Y is found to be faulty, it was supplied by HKP as opposed to PQR. This is important, as the financial consequences are radically different.

I recall from my CIMA studies that Bayes's theorem may be of help here. Using this, I should be able to calculate some expected values to determine the estimated costs of the alternatives, which should help us to make our decision."

Managing director: "I don't think that the first of the active approaches is feasible. We simply don't have enough service engineers to commit to such an extensive exercise. You'd better focus your attention on a comparison of the passive approach with the second of the active approaches. Please get to work on this straight away and let me know when you have prepared your figures. We will reconvene tomorrow and make a decision."

At that point, the board meeting was adjourned and the finance director returned to his office. By the early evening he'd prepared some draft notes ready to edit into his formal report.

Requirement

Imagine that you are the firm's FD and prepare draft notes that:

- Evaluate the numerical data and, based upon this alone, recommend whether the company should adopt the active or the passive approach to solving the problem.
- Demonstrate how Bayes's theorem may be useful in evaluating the data in the case.
- Discuss the longer-term issues of quality that the company should consider and comment on whether these might affect the recommendation that you have just made.

A specimen solution to this question will be published in the next (December/January) issue. FM

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Photograph: Ruth Prickett