

Appendix B

Case studies

These case studies are designed to promote critical thinking of the topics within this text. The cases are created from real examples, some fiction added, to help the reader in solving similar real-world problems in implementing RFID technology.

These case studies are designed to be answered by undergraduates as well as graduate students. The graduate student is expected to bring a little more statistical analysis rigor to analyzing the case problem or problems.

These cases are in addition to and separate from the study questions in Appendix A. Also, as the student or reader progresses through the chapters and lectures, so will the answers to these case studies be expected, in some cases, to pull from the previous chapter's study. These cases will challenge some preconceived ideas about technology insertion, specifically, the implementation of RFID technology to supply chain demands.

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Case study 1

Smart pallets for Harman's Repair Station, Inc.

Barry Benton walked into Harman's Repair Station a very excited man. He had just completed a class in how to use RFID for supply chains and he thought that RFID would be a perfect fit to save time and money at their igloo repair shop. All he had to do was convince the president, Don Harman, that RFID was something he should jump on right now.

Current situation

Today was Saturday, and Barry was the first to arrive, open the door to the repair warehouse, and start the coffee. Today was to be a slow day, one filled with paperwork from last week's netting, pallets, and igloos for luggage storage repaired from several Air Force and commercial cargo planes.

Barry walked around the warehouse inspecting everything to make sure the week's workspaces were clean and ready for Monday morning. The forklift was at the dock door readied for moving in the next igloo or metal pallet after Monday's pickup. He thinks the Monday load will be from the Air Force; they have some metal pallets to be sandblasted and cleaned. The bins for repair tickets were full of blank of blank forms; there were a few boxes left over with some netting material in them and a packing slip to check once more before mailing; the sewing machine and strapping material were wrapped to protect them from dust. Everything looked spotless and clean. The repair orders were coming in regularly now, but they still only used one shift, 5 days a week. With their staff of college students, Harman was repairing from two to four cargo nets and straps per day, performing sand blasting, cleaning, and minor repairs on two Air Force metal pallets per day, and fixing about five igloos from commercial cargo carriers every few months. The record keeping was simple; using a mixture of Excel spread

sheets to keep track of the different nets, pallets, and igloos repaired. They kept track of brand name, the owner of the item (usually just the Air Force), and two to four air cargo carriers. The bin of common replacement parts stayed full enough to cover a week's worth of work: metal fasteners, thread, all sorts of metal pins, and different toxic paints. The hazmat drums were taken away about once every 3 months, filled mostly with old paints and cleaning materials. Although the business seemed to be moving smoothly, and cash was flowing in, there was a concern Barry had. He thought that he could double the work they had with some new contracts, especially for the air cargo igloos. That was what he wanted to sell to Don: how to increase repair sales to the major cargo carriers by using RFID. Of course, one major problem was to find the right performance metric to use to sell Don the idea, and then for Don to sell the airlines. Barry had told Don over the last few months that RFID could be a way to improve business.

The sell

Don came in a few minutes later, a box of doughnuts in hand, ready to settle in, checking over last week's work orders, and hearing what Barry had to say. "So, what's all this about RFID, and how's it going to change our business?" asked Don, as he sat down at the former dining room table, now a conference table.

Barry said, "We have a good system at work, making money and doing a good job for the Air Force and a little work on the commercial side. But we can double our business if we just start using RFID tags to track the igloos we're repairing." Barry went on to explain how he had heard about the airlines were investing in RFID tags to track luggage, and the pilot studies would be completed very soon. Additionally, from his friend in baggage handling, he had overheard three airline executives talking about getting ready to invest several million to expand into RFID research in other areas. The airlines, though, were not sure in which area to invest other than luggage. The summer tourist season was ending, so he would give them time to get ready for next summer and convince the airlines to invest some of that money into Don's repair business. Barry said, with a little checking, he found out that the airlines send their igloos to China for repair. The few that come to Don's were those that need instant repair, those that cannot wait for shipment to China. "But there are over 500 igloos across the street at the airport at any one day, and we get over 600 widebody jets in here weekly," Barry said. Barry continued that with the large amount of cargo movement at the airport, an opportunity was just there for the picking, even if the air carriers thought they could get cheaper repairs in China rather than here in Anchorage.

Don asked how using RFID tags could possibly make them money, because the nets, pallets, and the few igloos that came in only had an order number to identify them for repair. There were no bar codes, even. In fact the repair shop had no facility to use bar codes, so why upgrade to some wireless tag technology, which was supposed to be the future beyond codes? The manual method of tracking and tracing the pallets and igloos inside the warehouse seemed to be working just fine.

Barry tried to explain that if they were to use RFID tags on the igloos, the minute they came into the warehouse, they could code the repair order number, the airline that owned the container, the type and make of the igloo, and the type or category of damage to the igloo. As the igloo moved through the warehouse, they could also update the passive RFID tags to their own database with the type of materials used to repair the

igloo. There would be an accurate time stamp for when the igloo entered the warehouse from the receiving dock and the time it left by the shipping dock door. He said all they would need is an antenna and reader at the two dock doors. Barry said, "While we move the igloo around the warehouse for repair they do not need to do anything but update the inventory items used for repair and record the workload time for the employees." Don replied, "I still don't see the need for these RFID devices. I know all about them from reading a magazine I picked up the other day, and I know how great they seem to be at saving retail stores like Wal-Mart on inventory items, but we are a small shop. So, why do we need RFID?" Don was interested, however, in the possibility of increasing the size of the repair business with the addition of the igloos from the airlines. Moreover, yes, he understood that the airlines were investigating passive RFID tags for luggage, because so many hundreds of thousands of bags are lost each year. Stretching from lost luggage to the luggage carriers, the igloos, was something else. He could see no connecting thread.

When the igloos are damaged, they put them aside and ship them to China. Some few find their way to Don's repair shop. Barry said that if the airlines were investing in RFID technology, it would not be too far a stretch to track passengers, luggage, and the luggage and cargo containers. They just needed to be sold on the idea. In addition, Don's repair facility was a perfect place to demonstrate this capability. The repair shop was right across the road from the runways and hangers. The igloos would come in, get tagged, and then leave with a permanent license plate of information that the airlines could track for themselves. "We would do the initial tagging of all their igloos, as well offer to provide a history of types of igloos used and that needed repair," he said. The airlines would reap a benefit in data mining on igloo conditions. Also if the airlines were to RFID readers in all their airports, they could track and trace each igloo and cut down lost igloos, which seems to be an industry wide problem. Therefore, Barry said, "All we have to do is convince the airlines to let us tag their igloos." Don still looked skeptical. "I am still not convinced that we need RFID tags," Don said.

Case analysis

What do you think the problem is for Don with the use of RFID for igloos?

What false assumptions, if any, did Barry make in trying to sell RFID to Don?

How could Barry have sold this idea any better to Don?

What advice would you give Don on his company's investing in RFID?

Case study 2

Muddy boots and smart wood

There was no question that the weekend was starting out as one Taylor would rather not be at work. However, she was the purchasing director of Vapid Lumber Industries (VLI), and the inventory had to be counted, one stick of lumber after another. The day was gray, the rain had started, and the workers would not show up today. This was the only time the lumberyard was quiet, the saws were not running, the forklifts not racing around, the fans not blowing, and the boss not screaming at some worker for not creating the door joints fast enough. Taylor's job was to walk the yard every 30 days, rain, sleet, hot, or cold. Today, in the springtime, the yard had more than nearly twice the lumber as last month. Bill, the sales representative, had been working very hard the last 2 months to stack orders, because he wanted a large bonus for his summer vacation coming in a few months. Then Taylor would do purchasing and sales and inventory together. Taylor went into the trailer office to get her pad of paper and pen. The yard was already ankle-deep in mud from the forklift and the flatbeds running around for the last month, and it seemed to be raining for the last 30 days.

The week before, Bill had been complaining that it would make his job and her job easier if they had a bar code system to read the inventory. Last year, the lumber distributor had starting stapling bar codes on the ends of each long and short piece of wood. But that was doing them no good at VLI, where the boss, Bob, would not hear of it. Bob was always trying to find ways to cut corners on the job. It took Taylor 2 years to talk Bob into buying a computer and convincing him that the Internet and simple spreadsheets could help with flow of products around the plant. That was enough technology for him, although Bob did seem to appreciate the monthly spreadsheets of how much wood was being delivered late from several distributors, and how the inventory and waste wood was fluctuating. That caused a few men to lose their jobs at first, but the use of the computer had not eased the inventory counting process or the inventory sheet written by hand that had to be sent to the home office in Texas each month. Taylor and Bill tried many times over the last year to convince the people at the home office that having 230 inventory sheets faxed each month could be replaced by sending the same information by Internet.

The big idea

The lumber waiting for cutting and shaping into door frames, window frames, and other construction special orders was sitting outside in the mud. There were 12 rows of lumber, each stacked about 10 feet high, and about four loads per row. As Taylor walked around, drinking her morning coffee, she decided to simply walk the yard and see what could be done with the use of bar code readers or RFID. Stuffing the pad and pencil into her jacket pocket, she examined each of the bar code labels on the ends of the wood just delivered. It was starting to rain again, and the ground fog was still around. The sky showed no promise of today's weather getting much better. As Taylor examined the bar codes, she noticed some of them were clean and readable, but as she rounded the corner to those stacks of lumber that had been in the yard for a week, she noticed some of the tags were torn. Must be either the manhandling or forklift driver running into things again. Or could it be the rain? She felt a few of the tags; they were definitely soggy and could easily be

torn or scraped as someone bumped into the ends. Taylor thought, if we could use a bar code reader for each flatbed load as it arrives, she would have an instant count of what was arriving, instead of having to count each one on the flatbed before she had it offloaded. Also if she had a portable reader, she could probably be using one now as she walked the yard. It looked like most of the lumber had bar codes on the ends; probably about 10% seemed damaged or were just missing.

So why not tell Bob to buy a bar code reader? That way, he would only have to pay for her time to walk quickly around the yard, rather than having to do it three times, as the company demanded she do. Counting the same thing three times was boring, and it was cold and wet, and it took all day, and sometimes most of Sunday.

As she was coming around the end of the lumber stack, she noticed a pickup truck. It was Bob. He never came in on Saturday. As Bob came over, Taylor decided to tell him her idea for using bar codes instead of hand counting the inventory.

Bob said, "You have what sounds like a good idea, Taylor, but the boys in Texas want an eyeball count. They don't trust technology. They trust you to see and count what is really out here in the yard. And that's what they want done at the other 229 lumberyards today, all over the United States." Bob went on to say that the home office had been burned in the past with computer technology. Also, he said, that this was a hands-on operation, a very simple manufacturing job. You take rough wood, cut it down, and make builder-grade door frames, window frames, door blocks and pallets. The manufacturing process was simple, and simple cost less money. That was the theory, and that was what Texas wanted and was what they would get. Bob then left Taylor to go into the office to pick up some papers, and he was gone in a few minutes.

Taylor just stood there, in the rain, looking at her watch. It was 7:15 a.m. She would be here until at least 5 p.m. How to convince the management here and at the home office that technology could be useful was the question she pondered, as she finished her coffee and began counting boards — one at a time.

Case analysis

What should Taylor do to convince Bob that the use of bar codes could be helpful?
Should Taylor and Bill go to Bob with an even more outlandish idea, such as RFID?

Case study 3

Alaska Supply Chain Integrators' cost of goods

Alaska Supply Chain Integrators (ASCI) purchases goods for oil companies working on the North Slope of Alaska. The North Slope is the oil production field where crude oil is extracted and then transported to the shipping terminals in Valdez, AK. From Valdez, the oil is shipped to other ports on its way to becoming refined petroleum products such as gasoline.

ASCI purchases approximately 40,000 items per year for these oil companies. The cost of goods (COG) purchasing, handling, and transportation process is subject to many variables.

Background

To enhance ASCI's supply chain capabilities, it has developed a state-of-the-art supply chain management and electronic commerce tool - a software system. This system facilitates control of the procurement process through a series of checks and balances. The various software modules describe the business functions in their names: SmartTracker, SmartCatalog, SmartMarkets, SmartMeasures, SmartBOM, SmartSpecs, SmartActions, SmartTagger, SmartBundler. Key to many of these e-commerce capabilities are time-sensitive measurement metrics.

ASCI's time measurement metrical units include weekly, monthly, and quarterly timeframes for three tiers of vendors. These internal metrics are also linked to the Balanced Scorecard method to track vendor delivery compliance agreements. Vendors are held accountable to on time and accurate delivery for the items they provide. Through the use of these metrics, ASCI's 2005 performance measurement achieved 90.6% on time and accurate delivery of goods to North Slope customers

The problem

ASCI's e-commerce solution is intended to address the lack of visibility in tracking or capturing the movement of goods from vendor to end user or client. This lack of visibility has been identified as recurring supply chain management problem that, if adequately addressed, would add value to the client.

To be fully inclusive and contribute the highest value, this visibility must provide not only tracking of goods purchased but the handling and transportation activities, as well. The logistics of moving the procured items provides a means to measure and enhance added value to the product while assisting ASCI in lowering the final price paid. As an example, one frequent event includes the misclassification of purchase price with the total price of the goods purchased, which includes transportation costs. In this situation, the cost of transportation is buried in the cost of the goods' purchase price. The indicated cost of material is inflated by the transportation cost which prevents or hinders the supply chain management team from identifying the true cost and potentially addressing root issues.

One key factor in providing the overall supply chain visibility is the capability to track the product from receipt to final delivery. Currently tracking is achieved through a combination of bar codes, visible inspection and person-to-person contact augmented by manual computer entry.

The RFID solution

At a recent meeting with representatives of MX Consulting, a proposal was presented to show that RFID could save ASCI more time and money in tracking goods from the vendors to the end customer's warehouse. Meeting with ASCI manager, Scott Hawkins, and several senior purchasers, Bob Tibmen, president of MX, explained, "With passive RFID tags on high value items, like the generator, you could track and trace its movement from the factory to the North Slope warehouse." Scott and his staff listened as Bob laid out how an RFID system not only could provide visibility along the entire supply chain, but could also be very useful in ASCI's cross-docking facility. Bob explained that when pallets of goods entered the facility they could instantly read what the product was, where it had come from, the due date to get to the North Slope, and any other related information. The key to successfully using RFID is that when boxes of items come in on a pallet, ASCI no longer have to open each box and read each item by bar code, or record any hand written information that might have been added to the bar code label as often happens. Bob said, "The use of an RFID tagging system could cut down on your labor cost; you could probably eliminate one or two positions in loading and processing and checking of products as they enter your facility."

Case analysis

What advice would you give Bob if you were one of Bob's *employees*?

What advice would you give Scott if you were one of Scott's managers or employees?

What is the basis for determining the price on the COG that could be changed by RFID?

What savings on the COG could be realized with an RFID system?

Case Study 4

Radio chips in credit cards

Gas station chip kill

Sara Wallace opened her mail and found her new company credit card. Sara was the operations director of MOAT Transport, LLC, and was excited to get her new business card. She was on her way from the office to the gas station to fill up the company truck and go check out the new cross-docking warehouse.

Although Sara was excited about the new card, she was skeptical about using it, because it was one of those new Scan-N-Go cards, containing some kind of radio frequency chip. Sara got out of the truck, turned to the gas pump, and held out the credit card in front of the Scan-N-Go scanner. The scanner immediately beeped and the small computer screen displayed the message, "Sara, welcome to Strickland's Gas Station. Would you like a car wash today with your purchase? Push Yes if you would."

Sara looked at the screen for a few seconds, looked at the card, and then placed the card on the ground and stomped on it with her work boots. Later, she told her boss, Will, "I stomped on it 10 times, and then held it up to the scanner." The gas pump was silent; the computer screen was silent. Satisfied, Sara told Will that she then used the credit card in the card reader the way she had always done. She said, "I killed the card. Well, I killed that radio chip inside."

RF dollar block

Ashley had been reading the magazine and newspaper accounts of these RFID tags that would be used inside your credit and debit cards. She read that soon every card would have one of these little chips embedded inside. The reports of these smart cards were that you could still use the cards with a card reader as before, but now all you had to do was pass the card in front of a scanner in RFID reader and your purchase would be made automatically.

Ashley had also just received her new passport. She was not very pleased to now have one of those RFID chips inside her passport any more than she was about credit cards being able to be read by some simple radio frequency device. She had recently run across a story on the Internet about companies that were against RFID, which pleased Ashley. She wanted to do something besides just be against RFID.

Ashley also ran a small, yet profitable, Internet business, selling helpful hints to housewives stuck at home with the kids. Ashley was one of those moms stuck most of the time in the house raising her two very young daughters. From her home in Virginia, Ashley had been selling small hand wipes for moms across the world, along with a recipe on how to make them at home. Ashley had many helpful cost-saving tips. And, after 6 years of this small business venture, she had a large following of mothers across the world, from the U.K. to Australia and all across the United States.

Ashley wondered if these other mothers felt the same way she did. So without much thought, she wrote a note about how she felt and sent it to her mailing list.

By nightfall, after the kids were in bed, Ashley again looked at her computer. What she saw was amazing. There were over 500 e-mails waiting to be read with the same reference subject, "What about these RFID tags?" Ashley stopped reading and responding to the e-mails shortly after midnight; she had to get some sleep. But the

response was overwhelming.

By morning, Ashley had another of her brilliant, yet untried ideas. She would cut a piece of aluminum foil, add some stickers on it, laminate it and stick it in her wallet. She had read that her passport had a similar foil lining to stop people from unauthorized reading of passports. So, why not make a fake dollar bill-sized foil and place it in your wallet? It would fold around your credit cards and no one could read it, except when you took it out of your wallet to use. Would it work? Ashley did not really know.

Ashley decided to post this idea to her e-mail friends, and she would sell it for \$3.00. So, she spent a minute taking a digital picture of her creation, posted it in a new flyer, and sent it out to all on her e-mail list.

The rest of the story is history. After only 1 month, Ashley received over 100 envelopes per day in the mail, each with \$3.00, \$6.00, or \$9.00. A few have \$15.00 in each envelope.

Case study analysis

What kind of RF safety and security safeguards should be built in to credit cards, passports, and other personal identification tags?

What are the major credit card companies doing to keep the use of RFID chip credit cards from being seen as a threat?

How could criminals exploit this fear of credit cards with RFID chips?

Case Study 5
Cool chain disaster

“We just turned away 4000 pounds of fresh wild Alaskan salmon.” complained Tony, purchasing agent for Platt Seafood, Boston. “That’s 40 boxes of garbage, a week’s supply that our customers are screaming about, and now I have to place another rush order.”

Tony was very angry. This was the second shipment since May that a large order of seafood had arrived spoiled. This time, it was too obvious. After 30 years as a fisherman, fish-monger, and now purchaser for his own retail chain, he knew when a hot load had arrived. In addition, this load had all the signs: He did not have to do an enzyme test; he could tell by touch and smell. This fish would not last a day. "Order refused," Tony shouted over the telephone to his supplier in Kodiak, AK.

Kodiak

Olivia was probably as angry as Tony had been when she finished talking and listening to Tony. This was not good for her Cold Water brand of fresh, wild-caught Alaskan salmon. Tony had just canceled his contract with her for any more seafood of any kind from Cold Water. Olivia had taken every precaution to get this latest shipment to market. She had to think. What had gone wrong?

She remembered this load because it was the best-handled load, using seasoned crews, not the part-time college kids from Anchorage. The fish had been iced right away on the boat, and this crew wasted no time at all at the dock packing the boxes for flying out that same day. The truck was waiting just for this load and the short ride to the airport.

Amy had ridden along with the load to make sure the load was put onto the GenAir cargo flight. The plane had taken off within 2 hours of getting the load to the airport. One hour later it had landed at Anchorage. There had been a Cool Commodity Freight (CCF) truck ready to take the load to the warehouse for repacking. So, within 2 hours of leaving Kodiak, the entire shipment was being put into the cool storage warehouse at CCF.

Olivia had called Tia at CCF to make sure her load was being handled properly, and Tia had assured her it was. It would be iced and packed into the insulated igloos for the next day, when it would leave Anchorage on its way to Boston. Olivia checked her Internet logs and saw that the shipment had departed Anchorage on time the next day and had arrived in Chicago, where it changed flights. That took about 4 hours, and then on to Boston. The flight logs to Boston showed that the plane's cargo arrived right on time. And she knew that Tony was there to pick it up right at the Boston Cool Chain warehouse down from the airport. So, what could have gone wrong? The timeline for transportation was right. The fish had the proper ice level. What could have caused the fish to be so bad when it got to Tony?

Chicago

The GenAir cargo plane arrived on one of the hottest days in August. The temperature was over 100°F, and on the runway it was even higher. Robie had overseen the cargo offloading from Alaska as usual. But today was to be a special problem. When he went into the cargo hold, it was a mess. Water everywhere. Boxes with water dripping all over the place. And the heat was really oppressive. It was like an August storm day in Louisiana. It would take an extra cleaning before this plane could be turned around.

He noticed the fish boxes right away. They were hot to the touch. This was not a good sign. GenAir had a great record of on-time delivery of seafood from Alaskan processors, and today's load was going to become a problem if he did not do something. He called his supervisor. Robie said, "What should I do with this load from Alaska? It feels hot, and I know it is." His supervisor, Henry, glared at Robie and said, "Load it on the next plane, and then get the cleaning crew and maintenance guys over there now. We have to turn this plane around in 6 hours for the flight back to Alaska." So Robie had the 40 boxes loaded and moved to the Boston plane. He knew this was bad; it sat in the hot sun for the next 4 hours. Then it was loaded on its way to Boston, out of their hands, not in Chicago, not on GenAir. Robie called the maintenance supervisor, Evan. Sure enough, there was a little thermostat problem, fixed in about 15 minutes.

Case study analysis

Think through the seafood supply chain of catching and moving the seafood cargo from boat to the customer in Boston. What were the trouble spots along this supply chain? Explain your answers.

What assumptions were made along this seafood supply chain by the various stakeholders? What were any vulnerabilities of these assumptions?

Could RFID time and temperature tags have helped this situation?

Think carefully about your answer, from the boat to the customer. What are the implications, the direct and indirect costs of using RFID? What is the value to be added to shipments of seafood using RFID?