

# The Organizational Change Dilemma Of ERP Implementation In A Small Manufacturing Company

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## ABSTRACT

*ERP implementation in small and medium-sized businesses is especially challenging not only because of their shortage of budget and talents but also of the strong organizational and individual resistance to the overall organizational changes caused by the new technology.*

*This paper presents an original case of ERP implementation failure in a small manufacturing company and how it is used to teach about organizational changes in a management class. Rather than leading a retrospective analysis of the case as many instructors would do with this type of change failure case study, the authors employed the four-step problem-solving case study approach to guide the students to identify the case problem, analyze its causes, prescribe and evaluate alternatives, and make a decision and develop detailed action plan to eventually solve the problem. The purpose with such a thorough, quasi-experiential learning case study was to develop the students' problem solving and decision making skills, particularly in understanding and leading organizational changes. Students received methodological, conceptual, practical, and technical learning benefits from the forward-looking, solution-focused case study of the small company's ERP implementation failure.*

**Keywords:** Problem-Solving Skills; Case Teaching; Organizational Change; Small And Medium-Sized Company; ERP Implementation

## INTRODUCTION

 Organizations need to effectively change themselves over time so as to catch up with the pace of changes in their environment and thus survive and thrive. Organizational changes can be overall strategic changes, which will cause subsequent changes in multiple functional areas. They can also mostly concentrate on one or more of those business functions without overall changes of corporate strategies, such as introducing new products, adopting new technology, entering a new market, or changing existing organizational culture and personnel practices (Burke, 2014). This paper focuses on a critical type of technology change – the implementation of ERP (Enterprise Resource Planning) system – in a small manufacturing company.

ERP is a single, integrated software system that supports the managerial need for real time information and decision making by all departments and functions of an organization (Scalle & Cotteleer, 1999). Historically, various departments and units in a company tended to use their own systems developed by certain vendors particularly for their functional areas. These different systems were notoriously unable to “talk” to or share data with each other directly. The ultimate goal of integrating various standalone, functional sub-systems under one single, umbrella information system (now known as ERP) became possible only after the past three decades of dramatic development in computer capacity and speed and network technology. The ERP system can save managers a tremendous amount of time and energy and give them more accurate data and information in real time. It enhances the firm's overall competitiveness and improves its communication as well (Umble, Haft, & Umble, 2003).

Although the benefits of ERP are remarkably appealing to companies, the actual process of implementation could be much more difficult than it sounds. Running an ERP system in a company sometimes means that everyone has to change their way of doing things, from the management to the rank and file. An ERP project may widely impact a company's operation and management from business process and procedures to organizational structure and culture, and to employees' and managerial roles and responsibilities (Stanciu & Tinca, 2013). ERP projects in many companies just could not meet their internal users' expectations. Some ERP projects failed and jeopardized their companies' business, such as in the cases of McDonald's, Nike, Whirlpool, and Hershey's (Wah, 2000; Cotteleer, 2002; Nelson, 2007) due to various reasons in terms of people, process, products, and technology involved in the project planning and implementation (McConnell, 1996; Somers & Nelson, 2004). The first two types of reasons, i.e., people mistakes and process mistakes, such as poor estimating and/or scheduling, ineffective stakeholder management, incompetent personnel and team issues, lack of sponsorship, and so on, particularly played a primary role in unsuccessful implementation of ERP system in many companies (Nelson, 2007). For small and medium-sized companies, there are extra challenges for implementing ERP in addition to those difficulties shared by large companies (Malhotra & Temponi, 2010; Ganesh & Mehta, 2010; Dixit & Prakash, 2011). Specifically, their lack of computer talents and their tight budget create great hassles in implementing ERP. All these reasons together make the organizational changes of ERP implementation in small and medium-sized businesses more difficult and more prone to failure.

This paper will examine the special challenges and difficulties facing small and medium-sized companies in implementing a major technology change and show how management instructors can build the students' problem-solving skills in leading organizational changes. The paper will first present a case of unsuccessful ERP implementation in a typical small manufacturing company in China, which is the hub of most manufacturing industries in the world today. Following the case scenario, the paper will describe how a four-step problem-solving case study approach is used to guide the students to identify the major problem in the case, systematically analyze causes, prescribe alternative solutions, and most importantly, make a smart decision and take step-by-step actions to solve the problem. Although the case per se bears a strong background in information technology, it can be used in such management courses as organizational behavior, organization change and development, and leadership development, as well as an introductory case to ERP system in a management information system class. Studying the case can help students better understand the complexity of technology changes in organizations, improve their skills to overcome resistance to organizational changes, and more effectively lead organizational changes in the future when they get down to the real world after graduation.

### **THE CASE SCENARIO<sup>1</sup>**

Founded in 2000 in Shenzhen, China, ANC Electronics Inc. is a privately-owned producer of uninterruptable power supply (UPS). As an independent manufacturer, ANC develops, produces, sells, and provides service for seven series and more than 80 types of UPS equipments for both industrial customers (e.g., mega data centers) and consumers (e.g., PC users). With 71 employees in 2010, ANC was organized into 10 departments, including R&D, Accounting, Production, Marketing and Sales, and so on. Its sales in 2010 was over RMB 20 million (\$2.42 million) with over 5,000 units sold.

When starting up in 2000, all ANC had as its management information tool was a few personal computers. In 2003, ANC introduced a financial management system developed by Kingdee and an inventory management system by Vanward, two popular enterprise software vendors in China. Both systems turned out to be very useful in facilitating the firm's business growth. ANC's other departments, such as marketing and sales, however, still had not adopted any information systems by that time.

As one of the pioneers in the UPS manufacturing industry in China, ANC's technology was above the industry average. But its size had been stagnant at the industry average, and its cost efficiency had been trailing the industry leaders. As the competition in the market became more and more fierce, ANC had to defend its market share from both multinational rivals and local new comers. John Guo, co-founder and CEO of ANC, believed the

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<sup>1</sup> This paper presents only an abridged version of the ANC case given the limit of space. A more detailed version of the case is used in actual class, including many technical details of the ERP system. The full version is available upon request.

key to ANC's survival and constant growth lay in a more effective approach that enables the small firm to respond more promptly to the market changes and control its total costs more precisely. A computer major in college, Guo had heard about ERP long ago and had been following its development in his industry over the years. Especially when he realized that ANC was lack of an effective, standard mechanism to control costs and assure quality, Guo began to think about how ERP could help with this. He felt an ERP system should enable the company to effectively accomplish its goals given the system's scientific nature despite its rigidity and inflexibility in many cases.

However, the other executives of his management team disagreed with Guo about the necessity of introducing an ERP system. They were more concerned about the financial burden of the huge investment of ERP implementation for the small company, although they were also well aware of the seriousness of the firm's quality and cost control problems. Instead, they proposed other alternatives to control costs and ensure quality. After several meetings, Guo as the CEO eventually persuaded other executives on implementing an ERP system. Given the constraint of budget and plenty of special requirements of the company's operation, however, Guo and his management team decided to hire a small, local software vendor to tailor-make an ERP system for ANC rather than to adopt a more expensive brand-name ERP system such as Ufida, SAP, Kingdee, or Oracle, the big four ERP vendors in China.

After several rounds of discussion, Guo and his management team set four primary goals for implementing ERP - integrating internal resources and centralizing data; efficiently managing capital; synchronizing material, capital, and information flows; and involving all departments in quality assurance and cost control. They also formed an ERP taskforce to carry out these goals. Guo was the team leader, with two vice presidents, one senior engineer from the R&D department, and Kevin Hu, the network administrator of ANC, as the members.

In reality, however, CEO Guo and other executives were fully engaged in other essential business obligations (such as market development and operation management) and traveled extensively around the country. The actual responsibilities of leading the ERP development and implementation project mostly fell on the shoulder of Hu, a self-educated computer and network expert who had been working in ANC for five years but with no experience of administering an ERP system. He was the liaison with the ERP developer and in charge of coordinating various departments of ANC to collaborate with the developer's analysis and design work. The individual departments first specified their business processes and needs respectively. Then Hu integrated the departmental analyses into an overall process chart for the company. The developer completed the system analysis and design by January 2010. It employed a SQL server database with major modules in production management (including quality control), material management, sales management, financial management, and human resource management. After a short period of testing in March 2010, the system was ready to roll out on a trial basis. A company-wide training program was provided to various department heads and key employees ahead of time, trying to teach them about the significance of the system and its operation principles and procedures. But the lack of attendance of the training program was a big problem despite Hu's hard push. Moreover, many operation workers on the shop floor who were supposed to use the system in their daily operation missed the training due to heavy production load.

The company had a high expectation on the tailor-made ERP system that would help it standardize its business process, cut costs, and improve its competitiveness in the marketplace. But instead the ERP system ran into plenty of unexpected problems in various departments over the trial period as described by several executives below.

- Tim Li, vice president of finance, "The work procedures of the finance department had been to examine and book-keep the data of purchase, sales, and inventory, which used to be reported monthly to us by other departments. Now we have to tabulate every record in the purchase and sales modules in the ERP system by ourselves before we can examine those data. Thus we have to understand every department's work process and know every product's model, specification, and code. My staff felt these were not on their job descriptions and it was just too difficult for them to concentrate on their own accounting duties with all these extra hassles."
- Bill Yang, vice president of marketing and sales, shared Li's complaints: "We used to be able to give our customer a quote directly based on the cost structure provided by the material control people in the production department. Now it's no longer the case. The material control unit won't

send us their purchase information anymore. Instead we have to search for it in the system by ourselves, calculate the costs, and then quote the customer. The interface between the sales department and the material control department is now blurred and completely different from the past.”

- Aaron Wang, the material control manager, “The ERP system runs a little smoother in our department than in the finance. But our purchase procedures were greatly changed as well. My buyers now have to analyze the structure of the materials needed by our UPS products and the conditions of the supplier under the new system. Besides, the prices of our materials fluctuate dramatically. Sometimes we have to artificially change the purchase cycle so as to avoid the price hike and reduce costs, even when the system shows the materials needed are already out of stock. This is completely against the system’s essential requirements. The biggest challenge yet came from the production department. Many operation workers have poor computer literacy and have rarely used computers before. They felt the production module in the ERP system was just too complex to run and was useless. Some of them gave it a try but gave it up right away. Moreover, they sometimes sneak around the system in order to meet the deadline and cut the cycle.”

Considering the strong, overall resistance to the ERP system by users from several key departments, and in order to maintain stable production and the established modules, CEO Guo asked the developer to modify the system as much as the departments wished. The modified system eliminated several modules originally planned, such as material control and quality inspection. Moreover, the finance module was not integrated into the system from the beginning due to data incompatibility. However, after several rounds of modification, the ERP developer eventually lost its patience and unilaterally bailed out, leaving ANC’s ERP system to a dilemma of incompleteness and lack of maintenance.

By now, the delivery cycle at ANC became unmanageable; the purchase cycle lost its elasticity; the departmental responsibilities were blurred; and the employees felt stressed out due to overtime work and lack of desire to participate. But the marketplace waits for nobody, and the competition is still the same severe as before, if not worse.

### **CASE STUDY WITH THE PROBLEM-SOLVING APPROACH**

While case study can be used to present exemplary business practices, reflect lessons from unsuccessful experiences, or illustrate non-evaluative business approaches, the authors highlight developing the students’ problem-solving or decision-making skills through case study in their classes. AACSB (2013) identified developing students’ problem-solving skills as one of the key learning goals for business school accreditation. Problem-solving or decision-making type of cases can be a very effective tool to fulfill that learning goal and build the students’ decision making skills. Given their quasi-experiential learning nature, problem-solving cases can simulate to certain degree the real challenges of decision making in business world, such as the ambiguity, uncertainty, risk, high stake, stress, and so on that challenge real world decision makers all the time.

Therefore, the students were requested to focus on a major problem that needs to be solved in the case rather than to retrospectively analyze what went wrong in ANC’s ERP implementation and how ANC could have done better, as many instructors would typically do with the case study approach. By stressing solving the present problem in the case, the authors asked the students to follow the four-step decision making model to deal with the major problem in the case as if they were the primary decision maker in the case scenario. In the ANC case in specific, the authors asked the students to look forward and think more about “what does Guo need to do next when facing the situation by the end of the case?” The students were asked to systematically identify the problem(s) in the case; analyze possible causes, their priorities, and their relationships to each other; prescribe and evaluate alternative solutions; and make a final decision and develop detailed action plan for the decision. (The only difference between the problem-solving model of case study used in this paper and the true decision-making model in reality is that the former lacks the post-event evaluation and feedback step of the latter. All in all, case study is just a simulation of business reality; real business scenario can and should evaluate the effects of the decision-making afterwards.)

**Step I: Identifying The Problem(s)**

The problem in the ANC case, as most students would quickly point out, was that Guo, the CEO of ANC, needed to make a quick decision on what to do about the operational chaos and the negative impact on the company's productivity caused by ANC's unsuccessful ERP implementation. By the end of the case, there is no doubt that the ERP project at ANC already failed. Students might cite relevant information and specific quotes of managers to make the case for their own judgment, such as the company's sales people could not quote their customers promptly, their purchase people had to ignore the system's requirements so as to cope with the price fluctuation, and their operation workers completely abandoned the ERP system. All these facts suggest that, instead of finger pointing or scapegoating, Guo needed to make up his mind quickly about the future of the ERP project before their business was further jeopardized.

**Step II: Diagnosing The Causes**

This is where the students were asked to analyze the causes or reasons that had led to the problem identified in Step I above. ANC's ERP implementation failure was mainly caused by the overall resistance in the company to operational changes resulted from ERP implementation. As many researchers (for example, Lawrence, 1969; Tobin, 1999; Erwin & Garman, 2010) pointed out, the resistance to organizational changes mostly come from two sources – organizational factors and individual factors. The organizational factors in ANC case that led to the resistance include the lack of support from the management in terms of funds and their actual time spent on the project, the firm's persuasion and inertia for accountability and reliability as a manufacturing business, the difficulty in coordinating the ERP projects among all departments involved, and the lack of reward and motivation for the rank and file for participation in ERP implementation. The individual resistance to the ERP project mostly came from the lack of computer skills by both the employees and the managers as well as their ignorance and misunderstanding of the ERP system. Of course, the organizational factors also led to and reinforced the individual resistance to the changes caused by the ERP implementation.

Over the diagnostic process, the students were encouraged to cite specific examples from the case to support their analyses of these organizational and individual resistances to change. For example, Guo as the CEO as well as his management team almost completely delegated such a decisive and integrative transformation project to Hu, a self-made amateur who lacked the skills, experience, and power to effectively mobilize and coordinate interdepartmental efforts in ERP implementation. Guo and his management team actually did not carefully plan, organize, and monitor the ERP implementation until it run into series of troubles. The operation workers in the line department rarely used computer in the workplace let alone such a complex system as ERP. The staff in the functional departments stuck to their old work routines and refused to learn new skills.

**Step III: Prescribing Alternatives**

After a thorough discussion, most students realized that, under the current circumstances, Guo faced two major options – suspending the ERP implementation immediately or pushing it forward with revised strategy and techniques. There could hardly be a third option, such as doing nothing but hoping the project would work out by itself over time. Then the students were asked to compare and contrast the two alternative solutions in terms of their pros-and-cons, feasibility of implementation, and the risk associated with each option. Obviously Alternative I could immediately stop and minimize the business loss in the small manufacturing firm. But it would bear a cost of wasted expenses and efforts spent on the project, managerial reputation, and the firm's long-term competitiveness. Nevertheless, Alternative I would be much easier to carry out with lower uncertainty and risk of failure than Alternative II. In contrast, Alternative II might be able to achieve the ERP project's four original goals set by Guo and the management. But it would require immediate, great changes in many aspects of the project implementation, such as technical expertise, financial resources, and stronger, direct support from the management. All these seemed difficult to realize given the company's small size, its vulnerability to market turbulence, and the low readiness of its managers and employees alike. But it is still worth analyzing Alternative II and letting the students understand the dilemma of decision making as a business routine for managers in the real world. This is where the problem-solving type of cases can contribute to the development of business students' decision making skills – the case study helps the students practice their decision making skills like real world managers in dealing with the critical changes involved in any business decisions – the high stake, uncertainty, ambiguity, stress, risk, and contradictory opinions.

**Step IV: Making Decisions And Implementation**

The most critical part of the entire decision making process is to make a smart choice among alternatives and develop subsequent action plan in details. Assuming the role of Guo, the CEO of ANC, most students eventually realized that they would probably have to choose Alternative I and suspend the tailor-made ERP implementation so as to avoid further business loss. A small manufacturing firm just could not afford such chaos and turbulence without sliding into the verge of bankruptcy. Pushing forward the present ERP implementation (“making the hay when the sun shines”) sounds just too optimistic and risky to the under-prepared, under-funded, and under-committed small firm. Last but not least, the system developer already dumped the project. ANC by no means could push forward single-handedly by its own staff. What ANC needed most at present was to stabilize its business and to survive after the ERP turbulence. (Of course, if a student insisted on his or her own choice of Alternative II, i.e., pushing forward the present ERP project, his or her decision would be respected; but he or she would also be asked to critically think about the decision and action plan with reference to what proposed below for Alternative I. The authors do not believe there are such things as correct answers to a business decision before it is implemented and turns out results.)

Consequently, the authors led the class to discuss and develop a detailed action plan for both the short run and long run, all following the choice of Alternative I. In the short run, i.e., one to three months, the authors felt ANC would need to take the following steps, focusing on the remedy of the unsuccessful ERP implementation:

- Guo meets with his management team, collectively evaluating the project performance, consulting their opinion about the future of the ERP project, and brainstorming remedies (but no finger-pointing). Then Guo declares to all managers and supervisors a temporary suspension of the project for modification and improvement. (His management team would more than likely welcome his decision.)
- The management asks each department as well as the ERP task force to preserve present codes, programs, data, documents, and any other interim outcomes of the present ERP project for future use or reference.
- Conduct a retrospective examination of the project, by the project timeline, examining what went right and wrong against the list of “36 classic mistakes” in IT project management as suggested by Nelson (2005).
- Well retain and maintain its current financial information system and the inventory management system; regularly upgrade both systems as needed.

However, the authors did not think ANC should completely give up its endeavor in applying ERP and improving its management efficiency. Instead, the authors suggested Guo and his team well prepare the firm in terms of technology, funds, training, and commitment and give it another trial in the near future. Therefore the authors proposed ANC should take the following actions in one to three years:

- Gradually introducing computers to all line and function departments and creating more opportunities for all employees to use computers and increase their computer literacy, starting with simple office use and document preparation. Encouraging employees to study computer and other technology with regular rewards such as tuition subsidy for attending relevant out-house computer training programs.
- Looking for benchmark examples of successful ERP implementation in small and medium-sized firms of manufacturing industries around the country. Inviting line and functional managers from those firms to visit ANC and share their experience with their counterparts at ANC about how ERP boosted their business and how they overcame the resistance to ERP implementation in their companies.
- Also searching for well-established ERP vendors who have abundant, tractable successful experiences in customizing well-tested ERP systems to small and medium-sized manufacturing firms. Inviting them to ANC to talk about how they helped their small and medium-sized clients to solve similar problems encountered by ANC.

- Setting up a technology development fund from annual revenues and accumulate financial resources for future ERP implementation and/or other technology advancement use.
- When initiating a new round of ERP implementation, Guo makes sure he is fully committed to the project himself, regularly checks up the project progress with the new ERP task force and management team, and backs up the ERP task force by helping them solve major interdepartmental problems. In addition, the management should require all managers and employees to participate in certain amount of hours of ERP training and get certified as credentials for their future pay raise and/or promotion.
- Benchmarking other companies' best practices in ERP implementation techniques, such as time box development, work breakdown structure, stakeholder worksheet and assessment graph, prioritized risk assessment table (top-10 risks list), project charter, agile development, build-and-smoke testing, and so on (Nelson, 2007).
- Guo might also want to draw on Kotter's (1995) eight-step model for successful organizational changes to guide him in coping with the resistance to ERP implementation, especially emphasizing a sense of urgency, forming a coalition, communicating his ERP vision to all employees, creating and rewarding short-term "wins," and pay more attention to consolidating, reassessing, and adjusting the change program.

Last but not least, is it possible for a failed change effort to come back and succeed at another time in the future? This is a question often raised by the students. The authors' answer is yes. The students were referred to the good example of the chocolate maker Hershey's renaissance of its \$110 million ERP implementation project. As mentioned before, Hershey's was notorious in the IT industry for its disastrous implementation of ERP (SAP) in 1999, which resulted in \$150 million sales loss with missed orders for both the Halloween and Christmas seasons due to the chaos in its inventory and distribution systems under the new SAP system (Cotteleer, 2002; Laudon & Laudon, 2003; Carr, 2002). However, the chocolate maker learned a lesson from its "too soon, too much" Big Bang style transformation of its management information system and the lack of leadership for the first rollout and did a great come-back job in 2001-2002 when upgrading its SAP system to the web-enabled R/3 4.6 system (Weiss & Songini, 2002; Carr, 2002). The company later fixed most of its problems in 2000, and the subsequent upgrade in 2001-2002 made over 30 improvements to its previous version and was completed ahead of schedule with 20% under the budget. How could that happen? The company's director of the SAP upgrade program attributed its second round success to its "strong program management and executive leadership, diligent planning and . . . an extensive testing and training plan" (Weiss & Songini, 2002). Therefore, an effective, well-proven management tool like ERP should be able to revive at ANC as well, as long as Guo and his management team can effectively learn from their past experience and well prepare the company in terms of technology, organization, fund, and leadership commitment in one to three years given the firm's small size. As the Chinese idiom says, "failure is the mother of success."

## CONCLUSION

As Hsiuju and Chwen (2004) argued, if an ERP project completely focuses on the technical side of the change and ignores its overall impact on the organizational system, it is doomed to fail. ANC's first ERP implementation did not accomplish their original goals and had to be called off mostly because Guo and his management team did not realize and take good care of the organizational changes caused by the technical change. As the CEO of the company, Guo would need to make a judgmental call about the future of the ERP project and then decide what to do next thereafter. The authors believe the small manufacturing firm can still have a fair chance to revive its ERP endeavor at another time if Guo and his colleagues could carefully reflect the lessons from the present failure, better prepare themselves in terms of technology, funds, and commitment, and more skillfully manage the risks of ERP implementation next time as suggested above.

The authors believe the students received four folds of learning experience through the case study of ANC's ERP implementation with the problem-solving approach. The first one is *methodological*. They learned and applied the quasi-decision making model to a complex decision making situation that well simulates the uncertainty, ambiguity, risk, and contradictory interests involved in all critical business decisions. The second fold of learning benefits is *conceptual*. The students realized that the technical system is always embedded in the social system even

in a small company like ANC. The success of technology transformation always relies on the effective changes of the firm's organizational and cultural aspects. The third fold is *practical*. The authors showed the students not only how to understand the problem, but more importantly, how to solve it, step by step, with detailed action plan in a specific business scenario. The authors emphasized to the class that "big ideas are cheap; the devil is in the detail." The last but not the least fold is *technical*. The authors briefly introduced to the students several popular and effective techniques in IT project management through the implementation part of the case study.

As a matter of fact, the case study of ANC's ERP implementation is just an example of how the authors use the problem-solving case study approach in their management courses to develop the students' problem solving and decision making skills in the real world. Through a series of more than a dozen cases like the ANC case over the semester, the authors systematically implement the experiential learning pedagogy emphasized by AACSB accreditation with a hope to make the students both book smart and street smart in managerial decision making.

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**NOTES**