PERFORMANCE-DRIVEN BUSINESS PROCESS MANAGEMENT METHODOLOGY FOR SMALL AND MEDIUM SIZED-ENTERPRISES*

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Abstract: Based on the analysis of the common limitations of business process management (BPM) methodologies and the requirements of small and medium sized-enterprises (SMEs), the importance of a "performance construct" of BPM methodologies is identified, a six-phase performance-driven BPM methodology for the production and operation processes of Chinese SMEs is developed. A case study on the process management of a medium-sized enterprise shows a successful example of running the methodology.

Key words: Business process management Process management methodology Process performance Performance-driven Small and medium sized-enterprises

0 INTRODUCTION

Many companies today have come to realize that business process management (BPM) is an effective and comprehensive means to improve the performance of business processes[1]. BPM is a customer-focused approach. It stresses systematic analysis, optimization, control, measurement, and management of all company processes to improve the company performance through cross-functional teamwork and employee empowerment. BPM is a broad term that covers a vast array of different organizational strategies from incremental continuous improvement (CI) to the radical reengineering of the business processes, characterized by business process reengineering (BPR). However, there is a growing body of evidence that indicates that neither of these approaches offers a high degree of success. Part of the reason is the lack of an operable methodology to navigate the implementation.

A review of the literature would find significant amount of business process management methodologies have been proposed. For example, Kettinger, et al[2], proposed a 6 stage BPR methodology, Povey[3] proposed a 14 step "best practice BPI methodology", Melnyk, et al[4], proposed a 11 step value-driven process management process, Elzinga, et al[5], proposed a 6 step business process management methodology, Harrington[6] proposed a "process breakthrough methodology", Davenport[7] proposed a "process innovation methodology", etc. But an analysis of these methodologies suggests that most of them pursue a similar path and exhibit commonalities in key areas. Almost all of the above methodologies are non systematic. Their emphasis stresses hands on experience and case studies rather than comprehensive research. The limitations of existing methodologies can be summarized as follows[8~10].

(1) Exclusion of a performance measurement. Most of the methodologies stop at the implementation phase. Managers don't know whether, and to what extent, the new processes are better than the old ones.

(2) "Universal" nature. It is extremely difficult, if not impossible, to produce a general methodology for all kinds of processes in all kinds of companies. But many proposed methodologies do just that. They are nothing more than general guidelines attempting to cover the needs of all organizations.

(3) Specialists-oriented. Many methodologies are specialists-driven. However, the people who want to carry out BPM in their company are the true customers.

(4) Large-company-oriented. Methodologies today assume a large company setting with large-scale resources dedicated to bringing about large-scale reengineering changes.

This paper, then, proposes a performance-driven BPM methodology with focus on the production and operation processes of small and medium sized-enterprises (SMEs). This new focus will alleviate many of the aforementioned limitations.

1 CHARACTERISTICS OF SMES WITH THE NEW METHODOLOGY

1.1 Characteristics of SMEs

There are special characteristics in production and operation processes of Chinese SMEs which may result in some problems at least in the following five different areas when a traditional BPM is applied to SMEs.

(1) Management perspective. There are both supportive and unsupportive management practices for BPM implementation. Management practices which support the application of BPM include short management radius, high cohesion, timely decision-making, rapid implementation of decisions and change in the enterprise, etc. The practices that do not support BPM are unscientific management method, nonstandard management system, randomicity in everyday management issues, etc. These unsupportive management practices prevent the acceptance and implementation of BPM in SMEs.

(2) Organizational structure perspective. Organizational grids of SMEs are generally simple, and with less administrative levels. Therefore, managers can carry out their daily activities with fewer interruption which makes the BPM implementation more convenient[11]. However, the unstable department relations and ambiguous division of power in SMEs are negative to the implementation of BPM.

(3) Leadership perspective. The leaders of SMEs usually keep absolute control of the enterprise[12]. That means leaders usually reject any change that endanger their sovereignty. But this sovereignty is a huge power support needed to propel the implementation of BPM.

(4) Resource perspective. SMEs cannot afford a large number of people, on a full-time basis, to work on a BPM project. It would hinder the SME's ability to operate. Therefore a consultant is needed. However, a large consultancy fee can also be a great burden for SMEs. Added to a consultant's fee is IT fees. BPM projects usually use advanced IT to facilitate optimization and improvement of business process. These huge IT fees are usually difficult for many of the SMEs.

(5) BPM result perspective. Compared to large enterprises,

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SMEs usually seek more short term profits than long term profits. However, there are some long term profit expectations. Therefore, the new methodology will need to balance short-term and long-term profit objectives[12].

All of these limitations and problems show that current BPM methodologies are not suitable for SMEs. SMEs need a different specially designed BPM methodology.

1.2 Suggested BPM methodology

A review and study of the literatures of business process management methodologies along with the above analysis of characteristics of SMEs suggests that a BPM methodology for SME should be as follows.

(1) Pursue practicability and maneuverability. Be developed for managers and people who want to carry out BPM projects themselves in their company.

(2) Emphasize the importance of performance measurement. The methodology, on one hand, should embody enterprise's strategy (through performance measures) to "do the right thing", and on the other hand, to monitor and control (through feedback) the business processes.

(3) Balance short term and long term rewards of a project.

(4) Be supported by an integrated software support system that can navigate the BPM project implementation and provide necessary tools.

1.3 Why performance-driven

Enterprises change their business processes for survival and sustaining competitiveness. A firm not only needs to satisfy their customers, but also needs to satisfy their shareholders, their employees, government and the society. Excellent performance is a synthetical embodiment by all customers and stakeholders. In this new proposed methodology, "performance-driven" is emphasized for the following reasons.

(1) BPM is defined as "a structured approach to performance improvement"[13] and an "initiative to improve and (re)design business processes to achieve competitive advantage in performance"[14]. Therefore, pursuing performance is the purpose of BPM and the mission of a BPM program.

(2) Performance is the ultimate driver for BPM. Armistead, et al, argues that the drivers for adopting BPM are: globalization; technology change; regulation; the action of stakeholders; and the eroding of business boundaries[15]. A common core thought underlying these drivers is that the organization's ability to attract and maintain excellent performance is threatened. This threat, therefore, motivates the enterprises to take steps to insure excellent performance.

(3) BPM should be aligned with strategy consensus. Business process performance measures are an effective medium to translate enterprise strategy into process actions.

(4) Failing to recognize the importance of performance measurement is a main reason for the high failure rate of BPR project.

2 PERFORMANCE-DRIVEN BPM METHODOLOGY

In general, the tasks such as mapping, analyzing, redesign, and implementing are included in BPM methodologies. In the proposed performance-driven methodology, three new tasks with concerns of performance measurement are added. They are as follows: ① Stakeholder expectation and enterprise strategy which are translated into a set of detailed performance measures and their target values(tasks 7, 8, 16 in Table 1). ② Current performance of the target process is measured as the baseline of the improvement(task 9 in Table 1). ③ The new process is measured (task 19 in Table 1). New process performance is the criterion to judge whether the objectives of the project have been achieved.

2.1 Prepare

There are a number of preparation tasks that are needed to help the BPM project's success. The most important task is to insure top management's support. The commitment and support from top managers is particularly needed when a company is installing more complex process innovation models. That is, the enterprise is being reengineered with new organization structures, new computer systems, and new business processes. The vision, mission, and strategy should be discussed and clarified with top management. Additionally, the project scope should be clarified. Next a number of preparation tasks should be performed under the commitment of top managers, including building and training the BPM team, identifying target process, and developing a schedule for short and long-term activities.

The BPM team is a group selected by top managers who takes responsibility for the whole improvement program. The team should include a diversity of people and skills. For example, the people who understand and actively use the current processes, and those who work closely with customers. The best size team ranges from 3~12 members[16].

The first task of the team is to clarify the objectives of the BPM, and based on these objectives, identify one target process. One process is selected because few SMEs, have the resources available to deploy an analysis and do an improvement of all of their business processes at the same time. Each process in the enterprise needs to be assessed separately to decide which of them needs improvement, and in what sequence they must be addressed. A simple method of identifying processes which may be in need of improvement is to do a performance/importance matrix analy-

Table 1 Performance-driven BPM methodology and its techniques

Phases	Tasks	Techniques employed
Prepare	(1) Get commitment and support from top managers, clarify the vision and strategy, and determine project scope.	Persuasion technique
	(2) Form the process management team	Team-building techniques
	(3) Identify BPM project objectives	Search conference
	(4) Identify a target process	Performance / importance matrix analysis techniques
	(5) Make the project plan	Project scheduling techniques
	(6) Train the team	Training techniques
Build a business process performance measurement, system	(7) Identify process stakeholders of the target process and their requirements	Stakeholders identifying and classifying techniques, survey
	(8) Establish process performance measures and set target values	Process performance measures eliciting techniques, benchmarking
	(9) Measure the target process' current performance	Process performance measurement techniques
Understand and analyze the target process	(10) Understand and model the target process	$IDEF_0$, $IDEF_3$
	(11) Analyze and diagnose the target process	Fishbone,Process FMEA
Redesign the target process	(12) Translate the stakeholders requirements into process design options	QFD
	(13) Design the process alternatives	$IDEF_0$, $IDEF_3$
	(14) Analyze the cost/benefit/risk of the alternatives	Simulation; Cost/benefit/risk analysis
	(15) Select one alternative as prototype of new process and design it in detail	$IDEF_0$, $IDEF_3$
	(16) Revise process performance measures and their target values	Process performance measures eliciting techniques, benchmarking
Implement the new process	(17) Implement the new process	Project management
	(18) Train the users	Training techniques
Measure the new process	(19) Measure the new process	Process performance measurement techniques
	(20) Further continuous improvement	TQM techniques

sis. The process with the highest importance and poorest performance is the target process.

Next, the BPM team needs to develop a project plan. This plan should include defining the activities, the cost, the schedules, the milestone, and the resource. Project management software will be very useful for developing the schedule and documenting actual progress.

Each BPM project is unique. Developing a project plan is where the team has its main opportunity to form the generic BPM methodology to suit the particular requirements of a project. It may be determined, for example, that a certain part of the project does not need to be carried out in great detail.

2.2 Build a business process performance measurement system

The purpose of any business process is to realize the strategy and objectives of enterprises and ultimately satisfy the stakeholders. Therefore, BPM must produce a business process that can meet or exceed the expectation of stakeholders. "A stakeholder in an organization is any group or individual who can affect or is affected by the achievement of the organization's goals[17]." A process may have more than one stakeholder. If there are multiple stakeholders, it may be difficult to satisfy them all. Therefore, the key stakeholders should first be identified and satisfied. Mitchell, et al[17], argues that the stakeholders were able to be distinguished according to three attributes: power, legitimacy and urgency. Stakeholders who hold all the three attributes are the definitive stakeholders whose requirements must be satisfied first.

The process performance measures are the measures most important to stakeholder expectations. However, there is not "a general method" to establish a process performance measure. We would suggest to use a process performance method proposed by Kueng[18]. In this method the high-level process goals are first defined according to stakeholder expectation and enterprise strategy, then, the goals are divided into sub-goals. Next performance measures are derived from these goals/sub-goals. Target values of a process performance measure are also important. Without target values, the project may lack motivational effect and process actors will not have an opportunity to work towards clearly defined goals. Furthermore, in the absence of to-be values, it would be difficult to measure process performance. Realistic and challenging target values may come from the following sources: scanning the market; asking stakeholders; competitive benchmarking; simulation and experiments.

The final task in this phase is to measure the current process performance by the defined performance measure. The final performance measure should suggest the current situation of the process and provides a baseline for improvement.

2.3 Understand and analyze the target process

When designing new processes, it is important to understand the existing target process. The objectives of phase 3 are to clarify the target process to the BPM team, to enhance understanding of the target process, and understand how and why the process operates. Process modeling is usually used as a tool to understand and analyze the target process. Process modeling consists of constructing a model of an existing target process which shows the relationships between activities, people, data and objects involved in the production of a specified output[19]. $IDEF_3$ is one effective graphical method to model the process. The $IDEF_3$ process model can not only facilitate communication among participants in the BPM work, but also provide the BPM team with the scenarios needed to analyze and identify all the problems that exist within the target process that must be eliminated in the new (improved) process. By $IDEF_3$ process model the BPM team can understand, analyze, simulate, redesign and finally improve the process. A second method is process failure mode and effect analysis (PFMEA). It is able to analyze a process in order to identify the process problems, their occurrence and severity, and the root cause of these problems.

2.4 Redesign the target process

The tasks in redesigning target process phase include as follows: ① Translate the stakeholder requirements into process design options. ② Develop alternatives for improving the target process. ③ Analyze the alternatives and select one as the new process to be implemented. ④ Revise the performance measures and target values according to the new process.

To develop alternatives for improving the target process, attention should be paid to: ① a thorough research on new capabilities provided by introducing new technologies–balancing the objectives of the target process and the necessity using novel ways to achieve those objectives and ② benchmark–looking at the approaches used by other enterprises operating the same process to see what is able to be learned from them.

In target process design, optimization and evaluation of process alternatives is common. Discrete event simulation is an effective and efficient analyzing technique that can exert immense utility. Cost/benefit/risk analysis is also a very useful technique for analyzing alternatives and making decision.

2.5 Implement the new process

New process implementation involves final validation of the new process and transmission of the new process throughout the enterprise. This will include procuring and installing tools and equipment for the process and training to show the correct application of this new process. New process implementation should be monitored by a detailed project plan, which includes, resources, costs, milestones and dependencies.

Training is essential both to ensure that the new process is operated correctly and to help remove the fears (of losing job, etc) and uncertainties that process change has brought to employees. Training may be "on the job", in a formal classroom, by self study, or by a combination of all of them.

2.6 Measure the new process

Measurement is very crucial throughout the whole BPM. In this phase, the improvement results is measured to test whether the processes has reached the desired state. Measurement includes collecting process data, calculating performance using the formula defined in the second phase, comparing the calculating result to target values and dispersing the final performance report to managers.

Occasionally a change intervention may not accomplish the goals. Also, tiny modifications may be necessary to adjust the change improvement to the new process performance standard. Furthermore, the results of these efforts would provide some clues for the continuous improvement of the business process. If this procedure were to be continued throughout the entire organization, the organization would eventually reach "the best class" performance standard in the industry.

3 CASE STUDY

3.1 Backgrounds

The case study is hosted by Holley Nisco Electronics Ltd. (HN). It is an electronic energy meter manufacturer owned by the parent company, Holley Group. HN is not responsible for either new product development or product sales. These two functions are outsourced by Holley Electronic Energy Meter Institute (HE) and Holley Sale Company (HS) within Holley Group. The relationship between them is shown in Fig.1.

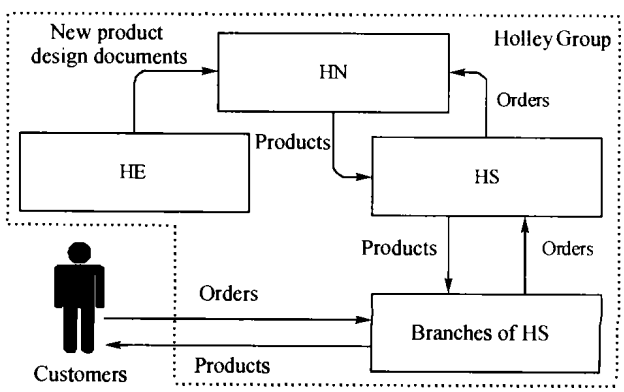

Fig.1 Function distribution between three organizations

HN is profitable but confronted by a number of complaints from both customers about poor quality and long delivery time, and the overtime of employee to meet production demands. It has tried several ways to increase production capacity, decrease cost and keep quick response to customer requirements. However, none of the attempts have solved all three of the objectives. Finally, the methodology proposed in section 2 is suggested to solve the problem.

3.2 BPM of HN

3.2.1 Prepare

The general manager of Holley Group, who is in charge of production in the group, with support from the managers of HN, HE, and HS commits and endorses support for the BPM for HN. Next, a meeting is held by the managers with support from the Institute of Manufacturing Engineering, Zhejiang University to establish the BPM team, and develop the project plan and objectives. The BPM team will consist of 6 members. They are: ① the manager of Q.C. department, Holley Goup; ②the Q.C. department Clerk, Holley Group; ③ the Q.C. Manager HN Division; ④ the Q.C. Clerk HN Division and ⑤ two writers of this paper. Then, the BPM team is to be trained for the performance-driven BPM methodology.

HN BPM objectives. The objectives established are: ① to improve current production and operation processes so as to improve customer satisfaction; ② to reduce employee complaints; and ③ to decrease costs. Now that the objectives are defined, the next task is to organize a team meeting to review and brainstorm related objective relevant processes and prioritize according to their performance and importance, as a consequence, a performance/importance matrix (Fig.2) is established. The matrix reveals that the order acceptance process is indeed the target process of the project. Following these tasks, the team needs to focus on the target process stakeholders and their requirement in the study.

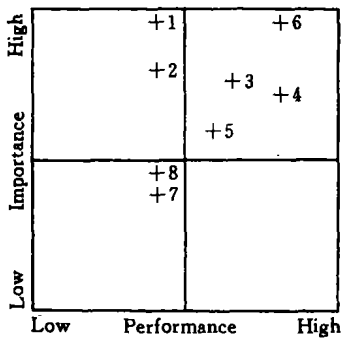

Fig.2 Performance/importance matrix

3.2.2 Build a business process performance measurement system

Target process stakeholders. The BPM team identifies critical stakeholders for the target process. The identification process call for the following activities: ① List all the stakeholders. ② Classify stakeholders according to power, legitimacy and urgency. Three critical stakeholders are identified and their most urgent requirements are investigated (Table 2)

Table 2 Stakeholders of HN Company

Critical stakeholders	Stakeholders requirements
Customer	Accelerated delivery High quality Quick response to requirement change
Employee	No work overtime
Shareholder	Profit

Project critical constructs—how to measure. In order to make the process improvement phase measurable, the BPM team establishes two constructs: ① Establish the performance measures from enterprise strategy and the stakeholders requirements to measure the order acceptance process. ② Conduct a benchmarking study to set performance target value which uncovers only two measures. The reason that only two measures are used is because of the difficulty in gathering data. They are "order fulfillment time" and "ratio of cost by damage". Their target values are set as 7 days and 0.1% respectively. The current values of the measures are calculated as the baseline of the improvement program.

3.2.3 Understand and analyze the target process.

Modeling the target process via $IDEF_3$, as shown in Fig.3 is used to understand the issues. By analyzing the established process model, the BPM team can uncover the interrelationships between parts of the process. It becomes evident that some of the process activities can be changed so that the stakeholder requirements are able to be more effectively met. The team plan next called for cause-effect analysis. A cause-effect analysis of the target process suggests the root causes necessitating a change intervention are: ① poor ability of quick changing product design and ② disordered process of transferring product order. It is the poor ability of "quick changing product design" that results in slow response to customer requirements which ultimately prolongs the order fulfillment time. The disordered process of "transferring product order" leads to not only time wasted but also information lost.

3.2.4 Redesign the target process

Our host Holley Group did not approve of the study of "quick changing product design" for reasons unknown. Therefore the team and the study can only look at one item—the process of "transferring product order". The BPM team members organize their ideas and present two solutions as shown in Fig.4 and Fig.5. In first solution (Fig.4), the process is radically redesigned. HS is deprived of the control ability of the orders. Furthermore, this solution requires that both the product design ability and the product design process are greatly improved, but these requirements are extremely difficult for HE to meet in a short time. In the second solution (Fig.5), the process is only changed slightly, but the process is standardized by two forms which are created as the carrier for standardizing the information transfer and as the record for defining responsibility. The first form is "technical feasibility confirmation form", which is used in step 2. The second form is "order form of HS", which is used in step 6. Considering the difficulty of implementing the first solution (in the customer's situation), the second solution (Fig.5) is adopted. But the first solution (Fig.4) is kept as a spare solution and will be implemented once the difficulty of implementation is decreased, that is, the product design ability and the product design process of HE are improved.

3.2.5 Implement the target process

Holley Group establishes a forcible industrial standard which not only standardizes the order acceptance process in detail but also explains how to carry out the new process. This standard is forcibly implemented in the whole group to ensure full implementation of the new process.

3.2.6 Measure the target process

The project team and host agree to run a test for three months to see if the performance has been improved. The results shown in Table 3 are recorded before and after the new process implementation.

Table 3 Implementing result of the new process

		Ratio of cost by damage w/%	Order fulfillment time t/d
Pre-implementation	May	0.07	10
	June	0.02	10
	July	0.58	10
	Average	0.22	10
Post- implementation	August	0.02	7
	September	0.03	6
	October	0.02	6
	Average	0.02	6.3

From the above evaluation results, the operation performance has been obviously improved in two different performance measures. But, it is found that the fax/tel expenses between sales man, HS and HN increases by a large amount. In order to deal with this problem, a web-based order transfer system is suggested. This

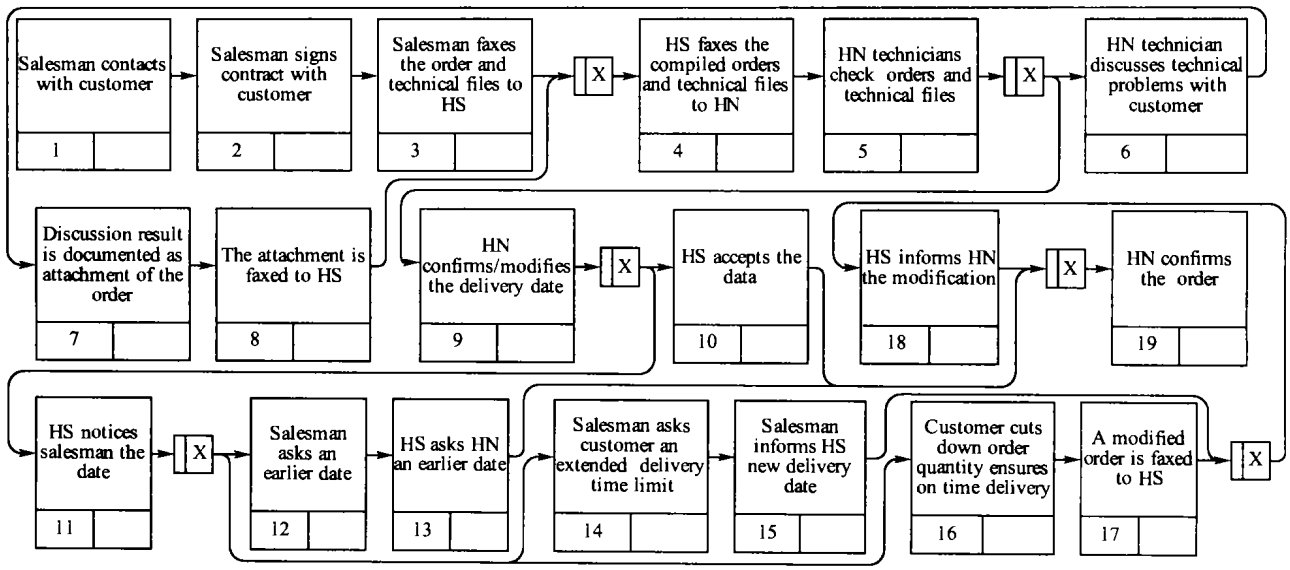

Fig.3 As-is model of the order acceptance process

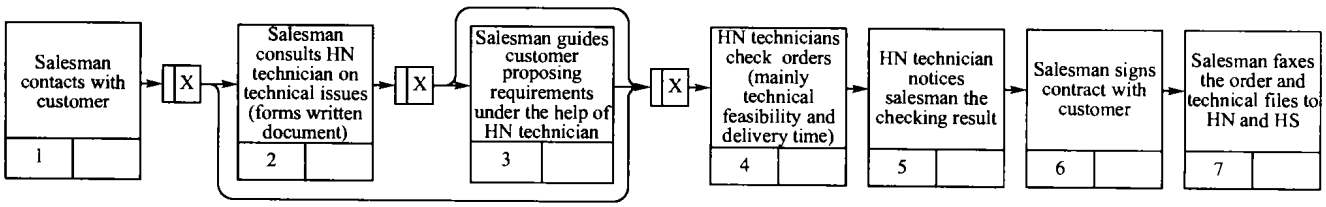

Fig.4 Unadopted to-be model of the order acceptance process

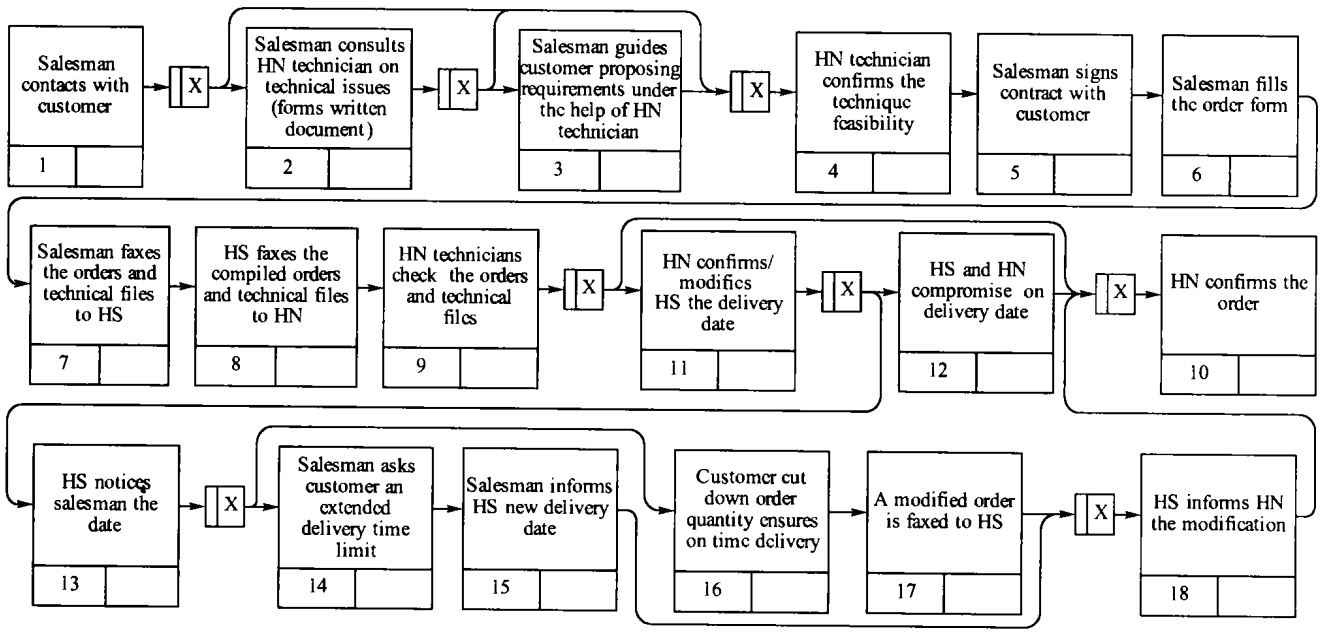

Fig.5 To-be model of the order acceptance process

system is integrated as a part of the electronic commerce system(under construction) of Holley Group.

4 CONCLUSIONS

A performance-driven BPM methodology is proposed for the production and operations processes of SMEs. The performance measures are bridges to translate stakeholders' requirements and enterprise strategy to process actions. Three important measurement tasks are included in the proposed methodology. They are: ① establishing of business process measurement system; ② performance measurement of existing business process; and ③ performance measurement of new business process. The case study on the process management of HN demonstrates the soundness of the methodology for SMEs in China.

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