ня знаний, компетенций, мотивации персонала компании. В частности, могут подвергаться изучению и оценке следующие сегменты информации, связанной с персоналом компании:

- сведения о полученном образовании, длительность работы по специальности, наличие специальных профессиональных сертификатов (например, ACCA или CMA в области управленческого учета);
- оценка эффективности работы сотрудников в соответствии с утвержденными показателями KPI;
- информация регулярного мониторинга степени удовлетворения персонала предоставляемым компанией компенсационным пакетом (зарплатой);
- результаты оценки потенциала профессионального и личностного роста сотрудников;
- сведения о степени лояльности сотрудников по отношению к компании (как правило указанная информация получается путем анкетирования и содержит сведения об отношении сотрудников к различным элементам корпоративной культуры компании, действующей системе мотивации, удовлетворенности персонала условиями труда и организацией рабочих мест).

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AGILE AND LEAN IN THE PRODUCTION ENTERPRISE INNOVATIVE PROCESSES MANAGING

Miasnikova Olga Vyacheslavovna
Belarusian State University, School of Business, Minsk
miasnikovaov1@gmail.com

The innovative potential basis is people involved in innovative processes. The main tasks of the production enterprise management are to organize coworkers functioning competently, to create incentives for the employee innovation activating, to put advanced experience and science achievements into practice. In the modern world their decision becomes the most significant factor for social and economic development of enterprise.

For rational interaction of innovation processes participants it is necessary to apply methods of logistics management. However, a certain preparation of the management object is required in advance. It includes the allocation of targeted movement of material, information, labor, financial, service and the interpretation of the performing works in the form of a flow model. The main prerequisites for the logistics mechanisms creation and development for inno-

vation processes of all hierarchical levels are the informatization, integration and globalization of economic processes and structures. The use of logistics as a methodology for managing and optimizing processes is aimed at reducing of the orders lead time, accelerating of new products commercialization, reducing costs, optimizing of the management functions implementation.

In traditional logistics material flow acts as the main objects of management, but in the innovation processes the information flow is predominant. Logistics of innovation considers the information flows and possible links among individual innovations, giving innovative activity a systemic character.

Performing its organizing function, logistics ensures interaction and coordination of the work stages and actions of the organization's innovative processes participants. A typical innovation process in industrial companies can be divided into three stages: Fuzzy front end, New product development and Commercialization, their relationship is presented in the figure.

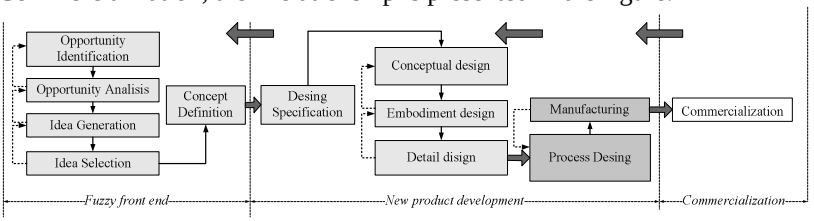

Figure . The main stages of the innovation process

Fuzzy Front End covers subprocesses from opportunities identifying, opportunities analyzing, ideas generating, ideas selecting, ending with the concept definition. The first stage outputs are valued ideas that further will be transformed into products. New Product Design includes design specifications, conceptual design, embodiment design and detailed design. At the stage “Production” the technological process design comes first and then a new product manufacturing has to be performed. The final innovation process stage is Commercialization when the product appears on the market.

The “Scientific Research – Research & Development – New Process Introduction – Production - Distribution” chain should form a system and provide a continuous process of parallel implementation of many innovations. Therefore the concept of Supply Chain Management (SCM) being a successor of the logistics may play a leading role in innovative data-driven projects where information flows management become the priority to solve issues related to both information and material flows optimization and costs optimization.

To solve the problem of innovative processes optimization we should use Continuous Acquisition and Life cycle Support (CALS) technology. Due to CALS innovation process participants work in a unified information space, exchange data in real time, save versions of the technical design decisions, analyze new product usage reports [5]. CALS covers the product life cycle

totally from the moment of its materialization in R & D step, through the entire production cycle and aftersales service cycle including recovery, reuse and recycling until the time of its disposal, incineration and landfilling.

Effective management and coordination of various tasks solution is possible only through "Cross-cutting" design systems - CADD / CAM systems, also known as CAE systems.

Computer-Aided Design/Drafting (CADD) is automated drafting technology for design and technical documentation. 2D or 3D CAD programs can help you draft construction documentation, explore design ideas, visualize concepts through photorealistic renderings, and simulate how a design performs in the real world.

Computer-aided manufacturing (CAM) means of technological preparation of production, provide automation of programming and control of equipment with equipment with numerical program control (CNC), programmable industrial robots or automated flexible manufacturing system (AFMS).

Computer-Aided Engineering (CAE) means of automation of engineering calculations, analysis and simulation of physical processes, carry out dynamic modeling, verification and optimization of products. CAE software encompasses finite element analysis (FEA), computational fluid dynamics (CFD), multibody dynamics (MDB), and optimization capabilities.

CAE software lets support an organization's product lifecycle management (PLM). Due to using CAD, developer creates a 2D or 3D geometric product model used as input data in CAM system. The developed product model is used to create a process model required for engineering analysis and manufacturing. Drawings developed and revised during the design process are converted directly into instructions for the equipment that will manufacture the desired object. CAE systems reduce the time needed to develop new products and increase productivity by providing greater flexibility in application of technological operations and by optimizing production flow and scheduling.

CALS technologies, standards and software tools provide an efficient and economical electronic data interchange (EDI) providing opportunities:

- Parallel execution of complex projects by several working groups (parallel engineering), which significantly reduces development time.
- Coordination of the activities of enterprises participating in the life cycle, expansion and improvement of cooperation ties.
- Reducing the number of errors and rework.
- Distribution of information support tools and technologies to post-sale life-cycle stages using a CALS component such as Product Data Management (PDM).

Innovation process activities require ensuring availability of specific types of resources in the right place and at the right time. The list should include engineering and technical specialists, maintenance personnel, laboratory equipment, computers and office equipment, measuring instruments and mate-

rials for research, production facilities for the production of prototypes and models and for manufacturing industrial samples, information databases, etc. This, in turn, requires the organization of all logistical processes based on Enterprise resource planning (ERP) systems.

ERP-system allows carrying out design and technological specifications determined the composition of manufactured products, as well as material resources and operations necessary for their manufacture, form sales and production plans, plan requirements for materials and components, terms and volumes of supplies for experimental and serial production. Modern ERP systems also contain components for manage projects, including scheduling, resources planning and budgeting.

The innovation process is carried out by different divisions and their activities must be coordinated and scheduled properly. To optimize lead time and costs as well as improve the quality of work is the task that is formulating and solving at each of the stages of design, prototype production, testing, test-result-based improvement, preparation of mass production.

The methods of such problems solving are traditional network planning, construction of tape graphs (e.g. Gantt chart) and graph optimization. The most well-known methods for visual presentation of innovation project's activities and milestones, their dependence on other activities for completion, and the project's critical path are PERT (Program Evaluation and Review Technique) and CPM (Critical Path Method).

However, a classical project management or cascade model (waterfall, WTF) leads to linearity of work performance and significantly increases the project time. To eliminate the limitations of the traditional management of innovation processes you can apply an Agile–Stage-Gate hybrid model to idea-to-launch processes for physical new products. The Stage-Gate methodology was developed by Dr. Robert G. Cooper as a conceptual and operational road map for moving a new-product project from idea to launch. A Stage-Gate model integrates with the adaptive project management model Agile to become what Cooper calls the Triple A System: Adaptive and flexible; Agile; and Accelerated [3]. The benefits of this hybrid model are a faster and more adaptive response to changing customer needs, better integration of voice-of-customer, better team communication, improved development productivity, and faster to market.

Cross-functional teams must successfully complete a prescribed set of related cross-functional activities in each stage prior to obtaining management approval to proceed to the next stage of product development. Agile is a flexible iterative-incremental approach to managing projects and products, focused on the dynamic formation of requirements and ensuring their implementation as a result of constant interaction within self-organizing working groups consisting of specialists of various profiles [1].

Agile Methodologies includes, first of all, Scrum (Crystal, LeSS, SAFe, Nexus et al.), Extreme Programming (XP), Feature-driven development (FDD), Adaptive system development (ASD), Dynamic Systems Development Method (DSDM), Lean Software Development (LSD), Kanban. Agile was born from the principles of Lean manufacturing and organizational learning.

Agile process takes core idea of Lean to eliminate/reduce non-value-added activities (named "wastes") and thus increase customer value. Lean adds the workflow scheme to process so that each of the iterations is performed equally qualitatively.

Kanban principles include: visualize the workflow, limit work in progress, manage and enhance the flow, make policies explicit, and continuously improve. A Kanban board as a tool to implement the Kanban method for projects lets manage the workflow. In Kanban the stages of the workflow are depicted as columns, and the tasks denote special cards. The card moves in stages, like a part in a factory moving from the machine to the machine, and at each stage the percentage of completion becomes higher. At the output, we get the product element ready for delivery to the customer.

SCM subsystem interacts with both customers and internal company subsystems, providing an opportunity to analyze business processes from the point of view of their input to delivering value to customers [2]. On the one hand, comparison of the added value provided by business processes with client's needs and expectations allows developing products that are in demand from the market. And, on the other hand, it makes possible to identify and eliminate unclaimed properties of product and its "imaginary" value (the value of the product at the producer's view) in other words eliminate "wastes".

It is fair to speak that process of designing, creating or updating, marketing and providing a product to a target audience, named new product development, becomes more and more flexible and lean-based. Innovation processes management system in part of new products developing is based on lean thinking and lean principles that originally were developed in lean manufacturing.

Lean Product Development (LPD) is based on a way of thinking and specific practices that emphasize a necessity to use less of resources, work-in-process, time and cost – to produce something, either a physical product, knowledge product or service product. We can highlight some principles of lean are used in LPD [6]:

- Define and maximize customer value. We should focus on information about what customers need and what value.
- Identify the Value Stream. A fact-based decisions are linking into a lossless stream.
- Make the value-creating steps flow. Flow Process and Pull Scheduling pulls work in a steady flow when resources are available (Kanban).

Pipeline Management avoids overloading the pipeline, controls release of work, and prevents buildup of product development work-in-process and queue time.

– Learn and improve. We need a constant never-ending process of improvement, an organization driven by learning.

LPD has incorporated the most valid management practices and technologies such as effective pipeline management, pull scheduling, lean gate review process, minimize multi-tasking, team-based project planning, critical chain project management, proactive risk management.

Lean Product Development targets not only synchronize activities, but also the creation of new products with high consumer value due to customer-driven development and quality function deployment. The work is carried out in conditions of uncertainty and variability by self-organizing cross-functional project teams. That presupposes usage of active design, parallel design and universal training for fine-grained management and organization of rapid knowledge transfer. Combinations of such approaches and methods such as Quality Function Deployment (QFD), Advanced Product Quality Planning (APQP), are used as well as rapid prototyping techniques. Rapid prototyping is a group of techniques (e.g. Rapid Tooling, Rapid Manufacturing)) used to visualize sketch mockups, design or engineering samples, as well as quickly fabricate a scale model of a product, tools and functional parts using three-dimensional computer aided design data and 3D printing.

There are several features of flexible design, we should mention some. Development is carried out in short cycles (sprints), after each stage it is possible to return to the previous one. Any elements, parts and prototypes of the product are quickly tested in real market conditions with the help of several clients, the product version they like is preserved into the project as well as consumer's new requirements are entered [4].

But it is the time-to-market for the product and its cost become more important than the contractual obligations in the field of technical characteristics that might be changed during the project time. Resource and pipeline management tools monitor and manage the product pipeline – maximizing project throughput. These tools provide visibility on the project flow and enable the establishment of a release rhythm as suggested by the theory of constraints and lean product development practices. The Lean Product Development uses Pipeline Management that enables to overlap the innovation process stages with each other to increase the speed of innovation, to vary of the number of stages of the process, depending on the scale, level of risk, and financing of the process.

The integration of the SCM subsystem into the management of innovative processes allows not only improving it but also significantly accelerating the new products market launch. Product Development processes based on lean thinking should be supplemented by optimal placement of new production

complexes and distribution centers, solution of the transportation and delivery tasks and optimization of existing capacities and material flows. And since the new market entering is inextricably linked with the formation of a new network of information and material flows between the links of the supply chain, the construction of such a system becomes the next strategic task of the SCM subsystem. By its solution the goals of innovative processes will be achieved and can lead to improve product profitability, increase demand by improving customer value, reduce development cost and reduce development time.

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ТЕХНОЛОГИИ ДОСТИЖЕНИЯ КОНКУРЕНТОСПОСОБНОСТИ ЧЕРЕЗ ФОРМИРОВАНИЕ УПРАВЛЕНИЕ ПРОФЕССИОНАЛЬНЫМИ КОМАНДАМИ

Папроцкая Инна Николаевна
Академия управления при Президенте Республики Беларусь, Минск
n-m-k@list.ru

Найти технологии для достижения конкурентоспособности, через управление профессиональными командами задача весьма сложная, но актуальная.

Общество стоит сегодня перед острейшей проблемой, обусловленной нарастающим противоречием: с одной стороны, происходит накопление интеллектуального потенциала, растут возможности его использования в управленческой деятельности, с другой стороны заметно снижение уровня управления.