

Robust Manufacturing Conference (RoMaC 2014)

## Production Phase-Out During Plant Shutdown

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### Abstract

Today's industry environment is characterized through a very unpredictable market. Therefore, companies establish robust production and logistics systems [1]. However, sometimes the established robustness does not prevent companies from location dynamics, including plant shutdowns or plant relocation [2]. Then, particularly, when big companies are involved and plenty of jobs are at risk, the public pressure is immense [3], which requires an effective management. Even though the market forces are obvious, the research intensity related to plant shutdowns is comparably low [4]. Appropriate expertise can be gained especially for the production phase-out (a repeated procedure), which is the operative implementation of every plant shutdown, but also takes place during standard product elimination.

The paper's aim is primarily to conceptualize the different plant shut-down options. Second, it targets on analyzing how the production phase-out and the plant shutdown are organized in industry and to investigate if and how these processes can be standardized to avoid inefficiencies. In-depth expert interviews have been conducted. A purposive sampling strategy was followed including companies ex-post to their plant shutdown caused by insolvency, consolidation, offshoring, divestment/product elimination and outsourcing. Based on the empirical results, the relation between production phase-out and plant shutdown is emphasized. The evidence results in a framework of plant shut down reasons and concluding processes. The further developed process for production phase-out during a shutdown displays a form of guideline for companies.

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Selection and peer-review under responsibility of the International Scientific Committee of "RoMaC 2014" in the person of the Conference Chair Prof. Dr.-Ing. Katja Windt.

*Keywords:* Product / production phase-out; plant shutdown; closure; location dynamics; offshoring; outsourcing

### 1. Introduction

Globalization, raising customer demands, as well as shortened product life cycles are significant current trends of supply networks [5]. In order to meet those requirements, companies start to build stable and flexible supply networks. Especially in mature industries, where the customer's bargaining power is relatively high and a declining demand is faced by the companies, industry needs to provide robustness.

Sometimes the company's robustness does not prevent from declining demand leading to plant downsizing [6], which may result in closures [7]. Extending the downsizing definition of Cascio [8], we define the *plant shutdown as the planned elimination of an entire plant site, thus terminating all production and the production-related activities including the cleaning of the shop-floor and the associated warehouses.*

In early literature, plant closures were seen as ultimate and negative option, sometimes named 'corporate restructuring' causing mass lay-offs and economic challenges at the regional and local level [9]. Even though closures in a single plant firm indicate a failure, plant shutdown in a multi plant firm may be a route to business success [10]. Simultaneous to facility closures, new ones start and the shifts need to be regarded as normal business alternative. Linking shutdown to project management makes ending a natural phenomenon [11].

Nevertheless, companies, despite already having accomplished several plant shutdowns, do not have any structured approach, nor even a contact person with knowledge and experience giving advices [12]. Companies need an ending-competence, including managerial skills beyond day-to-day business [11]. Thus, we intend to develop a shutdown process basing on the four production factors. The process includes activities to be performed in

the operative environment of the production. Having defined process stages and underlying activities, clear shutdown goals can be set, thus making benefit from the closedown effect [13], an increase in productivity and improved quality without any change of capital investment during shutdown plant [14]. Furthermore, we conceptualize different closure alternatives through analyzing German companies' shutdowns.

For defining a common starting point and a process, which is repeatedly performed in every company, not only during closure, we take the production phase-out. We define the phase-out as follows: *Production phase-out is a process, enabling a company to terminate a product's production at a certain plant. Starting after the phase-out decision, it ends with the finalization after the end of production.*

The remainder of this publication is as follows: section 2 analyzes the literature on plant shutdown and production phase-out. Section 3 describes the methodology applied. Section 4 deals with the conceptualization of shutdowns, followed by the process model elaboration in section 5. The final section 6 discusses the results, explains the contribution to research and management and gives an outlook on further research.

## 2. Literature Review

### 2.1. Plant Shutdown

The plant shutdown (or plant closure) literature's extend is very limited. Most authors focus on the employee's perspective. The existing publications deal with aspects such as union organization [7], social [9] and psychological [15] consequences of workers relocation.

Despite that research focus, there is a second trend, investigating why plants need to shut down [10], which characteristics make it more likely for a plant to be closed [16–18] and how to predict those happenings [6]. Furthermore, strategic considerations (e.g. divestment or market exits) are explored [19], and downsizing, without incorporating the shut-down is regarded [7]. For example, firms must carefully evaluate the national and local circumstances [20], e.g. the economic situation.

The first two publications actually dealing with the management of shutdowns are two articles of Janssens and Vansina-Bobbaert [21 & 22] out of which the first one describes a shutdown problem and the second one develops solutions. The authors elaborate different "go's" and "no-go's", especially regarding the employees' treatment. They also consider aspects regarding the quality control and the production machines. All solutions they provide follow the target of keeping the production as the same quality and quantity output as before plant closure announcement.

The third publication relevant for managing closures relates managing a shutdown to project management [11]. The authors' focus is on ending the business relations with suppliers, through developing an ending competence for the company's employees.

To the best of our knowledge, there is only one publication elaborating a shutdown management system.

Butler et al. [12] studied the case of Vauxhall Motors Luton when it was closed in 2002. The authors develop a facility closure management model containing a five stages approach including stage activities: (1) managing corporate brand name / legacy, (2) managing communications, (3) managing closure, (4) managing investment in employees, and (5) managing continuity of operations. It is depicted in figure 1.

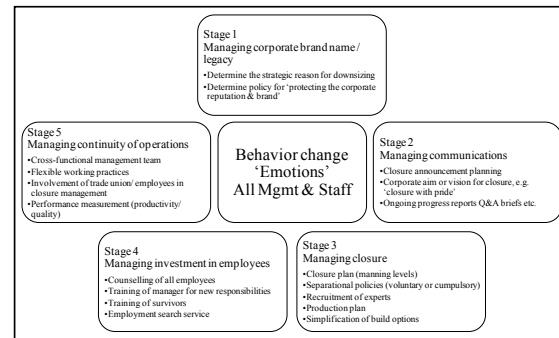


Fig. 1: Model of facility closure management [12]

From the depicted activities within every shutdown stage, not every single one is relevant for production. Only the 'production plan' of stage 3 indicating the need for a capacity planning for the period from shutdown announcement to the end of production, and the 'performance measurement' of stage 5 which intends to monitor the plant performance, target on operations management. Furthermore, the stages do not seem to be subsequent ones, they more aggregate different managerial tasks under certain headings.

As described above, mostly the human perspective is deeply investigated. Management approaches can be found seldom or on a very abstract level. The remaining production factors – material, and machines including equipment and facilities according to [23] – are not touched in any publication. Apart from this limitation, shutdown research focuses on marketing and strategic management. Also the empirical evidence can be criticized, since all shutdown management articles are based on a single-case study approach. Furthermore, incorporating the consequences, so to say what is happening after the end of production is not explained.

However, one research area related to the plant closure is the so-called product elimination literature. It deals with the production-oriented view on a product to be eliminated and how production can phase-out this product. The link is that during factory closure, the production necessarily has to be phased-out. Within this literature, we expect to as well gain insights for a phase-out during plant shutdown. Since no literature is available for the specific case of phase-out during a plant shutdown, we will subsequently analyze the general phase-out literature.

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