LOGISTIC ASPECTS OF COMPLAINTS PROCEDURES AGAINST SUPPLIERS OF ALUMINIUM COILS

KUREK Magdalena[1], FELIKS Jerzy[2]

AGH University of Science and Technology
[1]mag.kurek@gmail.com, [2]jfeliks@zarz.agh.edu.pl

Abstract

The paper presents logistic aspects of procedures connected to complaints against suppliers of aluminum coils that are used in a production process of beverage cans. The process of shaping a body of a can from aluminum stripes is exceptionally precise and thus, the material has to meet standardized requirements. Any deviations from the standards may cause several problems in the process from increased number of jams in a press to the damage of shaping tools or problems with mechanical parameters of final products. The procedure of complaints consists of several stages that involve transport of the withdrawn coils and the exchange of documentation between various departments in a company and its supplier's representatives. The paper shows the path that is defined by the procedure of complaints accompanied by its formal representation in documentation. The path is illustrated from the moment when the problematic coil is transported to a production line and first problems appear to the acceptance of the complaint and the moment when the problematic coil is collected by a supplier.

Keywords: Supplier, B2B complaint, transportation, waste, beverage can

1. INTRODUCTION

There is no company that could exist and function as an isolated unit independent of other companies. Customers, competitors and suppliers have a significant influence on a given unit. One of them is especially interesting in the context of complaint, that is the relationship between a customer and a supplier, especially when it is a business-to-business relationship. It is obvious that apart from many other factors that influence the relationship, returns and complaints about a product are a problem that may have a significant impact on it. Thus, it is important to create clear procedures that are acceptable for both sides, and which will assure efficient and fast complaint handling. This issue is more complicated in asymmetric business-to-business context, that is when one of the partners is a much bigger company that the other.

Another aspect that is not often discussed is the internal costs of complaints that the customer need to incur because of the occurrence of a non-conformity. In the context of beverage can production process, these costs emerge mainly from the waste of time on a production line, and at the same time logistic operations resulting from the non-conformity, mainly transport and storage operations.

Can making process is precise and fast. Thus, it is important that aluminum stripes used as the input material meet highest standards. If a complaint against the material appears, the main aspect which is usually taken into consideration is: the cost of wasted time on the production line, wear of tools and possible costs that may appear if a deliverer does not accept the complaint. However, since a coil weights about 10 tones, logistic aspects including its transportation should also be taken into account as a cause of additional costs as well as additional potential danger for employees.

The aim of the paper is to present logistic operations resulting from non-conformities concerning aluminum stripes used as input material in can making production process. The aspect is described from the customer's point of view. The paper concerns non-conformities that are observed and identified after the coil is loaded on the line and the production process is already started. Another aim of the article is to show a complaint against

a supplier into B2B environment, also asymmetric one, as a specific type of a relationship which also determines the complaint procedure that is realized in the customer company.

2. LITERATURE REVIEW

2.1. Complaints as an element of relationship between a customer and supplier

Contemporary marketing involves studies over relationship between market participants. Cooperation between suppliers, their customers and other business organizations is a base for long-term relationships, preferably based on trust, commitment and mutual dependence and investments [10]. On the other hand, it is hard to find a long-term business relationship without conflicts or problems, especially in an asymmetric bond, that is when one of the companies is significantly larger than the other. Some studies showed that most business relationships involve some degree of stress often related to the imbalance between the partners [11]. While some relationships between companies are already studied and explained in detail, others, involving the aspects of conflicts and stress which often result in complaints have been neglected in research. Stresses and further complaints are with no doubt a phenomenon that occurs occasionally, however complaint management influences the relationship between a customer and supplier [13]. It is important to emphasize that complaint occurrence does not always need to be a negative aspect. Sometimes it may be treated as a present, although an expensive one, as it is an information about the internal efficiency and quality status of the process.

2.2. Complaints in the context of B2B versus B2C relationship

Since the paper concerns the aspect of complaints against a supplier, it is important to analyse the subject. While complaints are widely analysed and examined in the field of business-to-consumers relationships, the aspect of complaints in B2B is less frequently studied. [4]. The main differences between B2B and B2C are shortly described in [5]. These are:

Complexity of issues - the issues in B2C space are less complex and involve less back and forth communications than in B2B, thus the problems in B2C space require shorter time than issues in B2B environment, of which the customers are usually aware. As a result, it may be assumed that the time period in which a given problem is solved is not as crucial in B2B as it is in Business-to-consumer space [5]. However, as it can be seen in [6], fast reaction and solution of a complaint should help develop long-term relationship between customers and suppliers in B2B space [7].

Number of customers and scale- In B2B environment it is rare to have as many customers as in B2C while the scale of sales is much bigger. As a result, in the case of a return from a consumer who is not satisfied with a product, the company may lose the equivalent of value of a product. On the other hand, in B2B environment, where often deliveries are worth thousands and are counted in tonnes, a customer who is not satisfied with a supplier's product may have a big impact on the company.

Knowledge about customers - the number of customers in B2C is usually so big, that it is hardly possible to have close relationship with all of them, especially when products are sold by agents. As a result, when a customer is not satisfied with a product, he is usually anonymous when he contacts the company for the first time. In B2B, on the other hand, the sales process brings some data and basic information about a customer, so in the case of a recall or a complaint, the supplier already possesses a profile of the customer. What is more, in some cases, in B2B areas, cooperation may result in personal friendship or other good personal relationships which is rarely observed in B2C.

Multiple Contact Potential - A contact within B2C is generally a contact with a single person who bought the product. In B2B space such a contact is rare. Usually many people use the product within the same customer company and thus various people may contact a supplier with various problems concerning its quality.

However, it may also happen that many people will contact a supplier with an issue concerning the same problem.

2.3. Complaint proceedings in the context of small and large companies

Apart from differences between individual customers and industrial companies, another important aspect of B2B are customers' expectations towards complaint management that result from asymmetric character of the relationship between a supplier and customer. Although, the research included in [10] does not clearly prove the assumption that smaller companies differ from large ones in the aspect of their expectations toward complaint resolution because of the uneven position in contrast to the partner, an assumption may be made that such factors as size or power differences between a supplier and a customer have impact on the complaint management [13]. What is more, it may be assumed that large companies who are more powerful than their suppliers, may negotiate better conditions for resolutions, and at the same time, smaller customers may be more accommodating and focused on keeping good relationship with an important supplier [10].

Such asymmetric relationship may be observed in aluminum beverage can industry. There are large and smaller companies on both can producers' and material suppliers' sides. The relationships between them often have roots in strong and long-term cooperation, however the conditions of the cooperation may differ from one another which may result from the imbalance of power in some of the relationship. The imbalance may also influence procedures and actions of customers, which was called by Clark [8] as 'available zones of manoeuvre'.

2.4. Complaint procedures in B2B

In many B2B spaces, the best moment to check quality of delivered products is the moment of goods receiving. It is the best moment to check both the condition and volume of the delivery. However, in some cases, quality control of a delivered product at the moment of receiving is not carried out, and the customer relies on the quality management system of a supplier. In such cases, a complaint procedure should be started as soon as problems with a product are observed [9].

The theory usually focuses on inter-company complaint procedures and says, that the non-conforming product should be immediately isolated and left to carry out actions connected to complaint. The basic document of the procedure is a complaint protocol that should include at least such information as: name of the product, the volume of recalled product, description of the defect and the customer's request. According to the agreement between a supplier and a customer, the complaint protocol is either sent by fax or email and is based on a form proposed by any of the partners [9]. A supplier should consider the complaint within the fixed time and either accept it or deny. If the complaint is accepted, if it is possible to fix the defect in customer's company, the customer should agree on it, but it is a supplier who incurs the costs. Otherwise, the product should be sent back to the supplier where it will be fixed. To prevent further delays in production, a customer may ask the supplier to deliver replacing products for the time of repair [9].

If the product cannot be fixed, it should be broken up for scrap on supplier's expense. In such cases, it is necessary to prepare a scrapping protocol. The supplier should also realize a supplementary delivery [9].

Apart from standard procedures concerning complaints, some other agreements are worth implementing, for example [9]:

- The customer informs the supplier about non-conformities immediately after they are detected
- The supplier implements correcting actions immediately after a complaint is issued and presents them in 8D report
- The non-conforming product that cannot be fixed should be marked and isolated in a special area

The non-conforming products are left in an isolator for a fixed time in which a supplier may carry out its own analysis. After the time period, the customer breaks the product up for scrap on the supplier's expense, and any remarks from the supplier will not be taken into consideration after that time.

3. BEVERAGE CAN PRODUCTION PROCESS

The production process of beverage cans is known as a very precise and fast one. While the annual production of beverage cans may be counted in hundreds of billions [10], the speed of a press shaping a can body is 350 cans per minute [10]. At the same time, the material used in the process is an aluminium stripe of thickness between 0.270 and 0.245 mm while the wall thickness of a final product does not exceed 0.160 mm (for 33 cl cans) [10].

Moreover, the production process consists of several operations in which the quality of a stripe and conditions of shaping tools are crucial. **Figure 1** presents a schema of the production process.

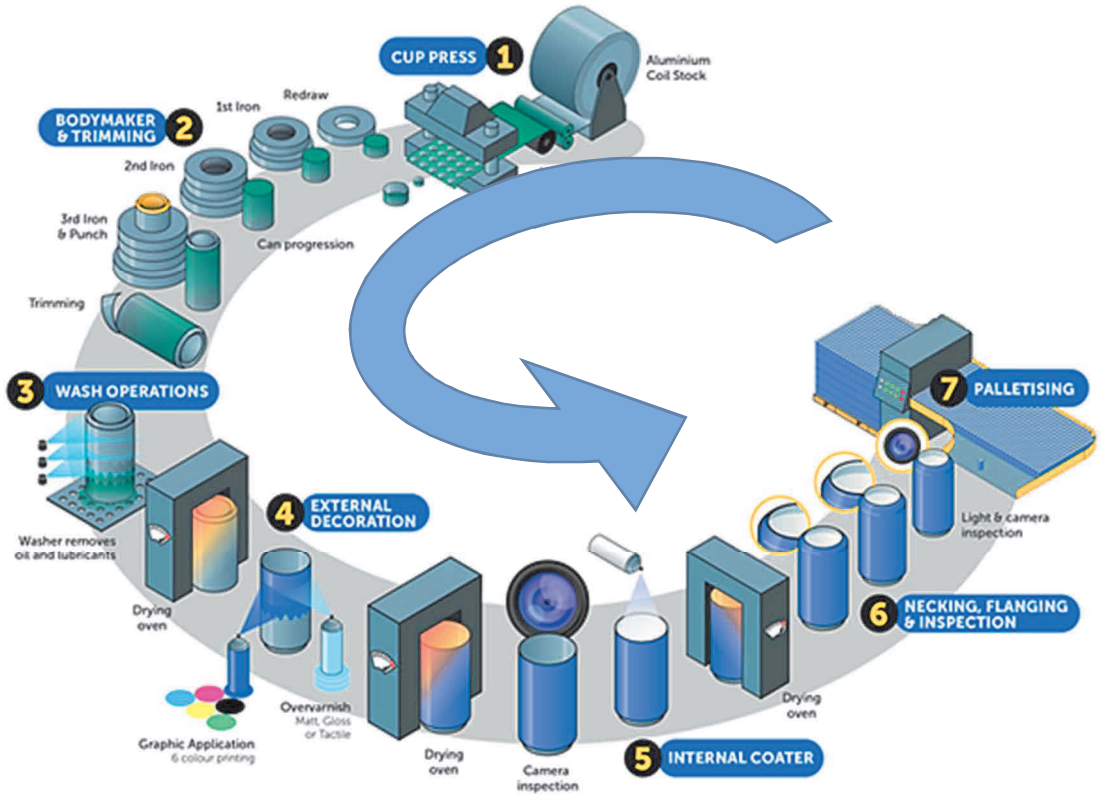

Figure 1 A diagram presenting the aluminium beverage can production process. [11]

The process starts from loading a stripe on a feeder with lubricator. Then the stripe is transported to a vertical press called 'cupper' where 2 operations take place - blanking and drawing [13]. The cups are then transported to horizontal presses where can body is shaped. Several operations are realized in only one stroke, these are: redrawing, 1st, 2nd and 3rd ironing and dome shaping (in the bottom of a can) [13]. The cans are then trimmed and washed from all lubricants and coolants that are used in presses. After drying operation, cans are decorated and lacquered, as well as the internal coating is put on [13]. Later, a neck and a flange are shaped which allows for closing with a lid after filling a can with a liquid. **Figure 2** presents the evolution of shape after each forming operation from a blank to a final shape of a can.

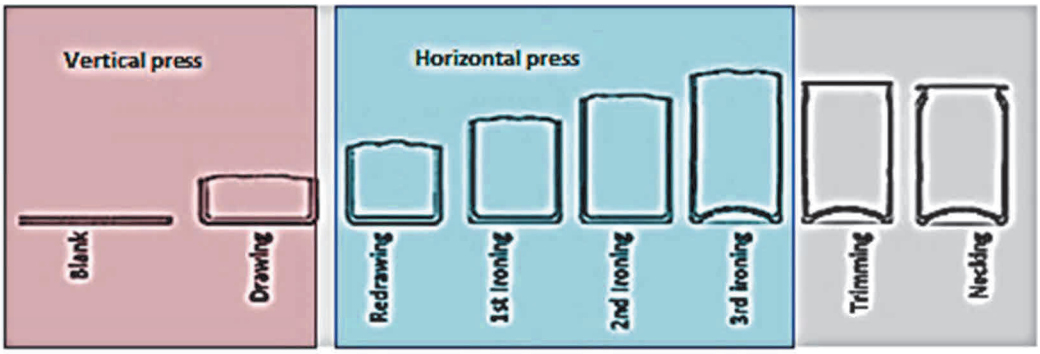

Figure 2 Evolution of shape of a can from a blank to a final product. [14]

3.1. Complaints in a can making process

The material used in this production process is aluminium stripe from 3XXX series aluminium alloy in H19 temper. The requirements that the stripes have to meet concern 3 main aspects:

1) High strength
2) Good formability
3) Good corrosion resistance.

The first aspect is important from the point of view of the final product. High strength determines also parameters of final cans, such as: axial load, dome reversal pressure, dome growth caused by exposure to a set internal pressure. Finally, good corrosion resistance is important form the point of view of the use of beverage cans. Because they serve as packaging for various beverages, cans need to be resistant to corrosion, otherwise they could not be used with a contact with food. Strength and formability of stripes are determined by parameters of production process which includes hot and cold rolling.

The important aspect of stripes is that they are delivered as about 10t coils of length counted in kilometres. Because of that, it is hard to check the quality of coils on the length of the coil. Thus, some beverage can producers rely only on certificates delivered by suppliers that ensures quality of the stripes. Such certificates contain information about:

- Chemical composition
- Yield stress
- Ultimate strength
- Elongation
- Anisotropy
- Dimensions: i.e. width, thickness.

However, it is important to emphasise that obviously certificates may be based only on data that is collected from samples taken at the beginning of a stripe (it is not possible to take samples from the middle or end of a coil). As a result, it is possible that in the case of some problems during production process of aluminium stripes, some defects are not revealed in the final quality inspection realised by suppliers. The problems, on the other hand, may appear on a production line of beverage cans and result in a complaint.

Complaints against suppliers may have many causes that may be divided into 3 groups presented in **Figure 3**. The first group consists of evident defects that may be visible on the stripe, for example inclusions, scratches, holes, etc. The procedure concerning complaints caused by defects form this group is simple, as there is no difficulty in proving the supplier that the material does not meet basic requirements.

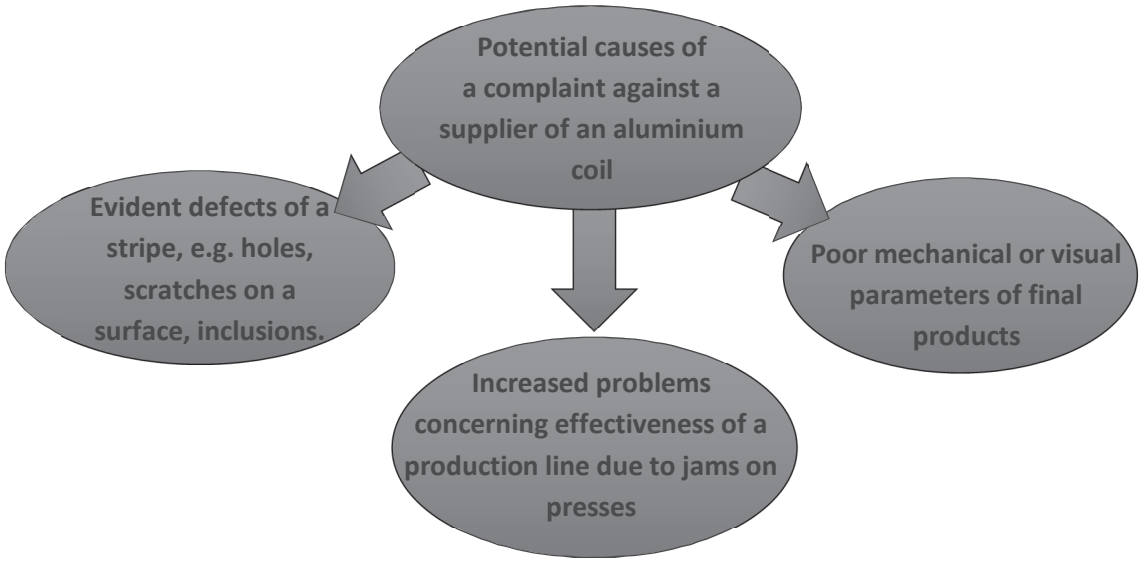

Figure 3 Groups of potential causes of complaints against suppliers.
(Source: Own elaboration)

Another group of complaints is more complicated and is based on poor mechanical or visual parameters of final cans. Quality management in companies which produce beverage cans involve tests of mechanical and visual parameters of final cans.

Figure 4 presents parameters of final products of can production process. The parameters concern such aspects as:

1) Dimensions: height of a can, internal and external diameters, height of a flange, thickness of thin and thick wall of a can
2) Mechanical properties, including dome reversal pressure, dome grow under internal pressure, axial load, and drop test.
3) Aesthetics of a can: quality of decoration
4) Safety of a can: quality of internal coating, leaktightness and cleanness of a can
5) Other: friction coefficient of a bottom and wall which determines cans mobility, unproblematic transportation of filling lines of a producer and customer.

From the perspective of complaints against suppliers, the most important group is the group including mechanical properties. These parameters are crucial from the point of view of a customer. Thus any problems concerning low values of dome reversal pressure or axial load need to be identified and solved as soon as possible. The experience of can producers shows that the main cause of poor quality performance of final cans is mainly caused by insufficient mechanical properties of input aluminum stripes. In such cases, the best solution to prevent further costs is to recall the coil from a can production line and isolate the batch.

Another problems with parameters of final cans are their aesthetics properties. Several defects of aluminum stripes may cause insufficient quality of a surface. In this case it is also important to observe the scale of the defect and take up some actions.

If there are any significant deviations from the set standard, the quality department should inform a production department about their observations. The department may then decide to recall the coil and start complaint procedure.

The most interesting group of complaints is the group including the problem of increased number of jams on presses, especially jams on horizontal presses, called 'short cans'. The term includes all problems during shaping a can body that cause damage in the product and consequently the jam on a horizontal press. This group is the most interesting because of the procedure of complaints that is different from procedures concerning other 2 groups.

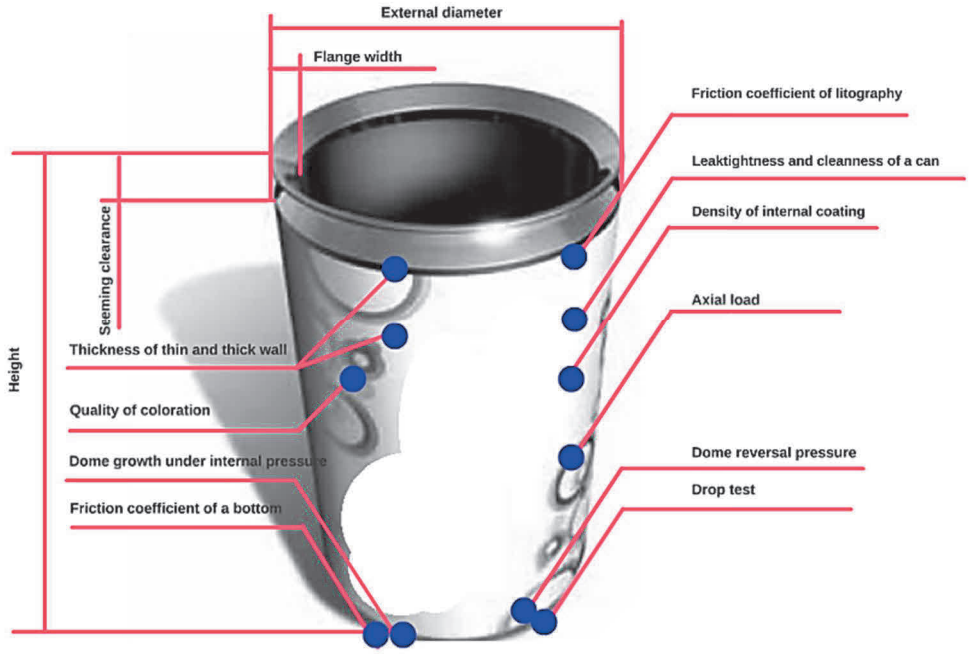

Figure 4 Properties of final cans that are a subject of concern for customers.
(Source: Own elaboration)

Every beverage can producer sets an acceptable value of 'short cans' per million of cans produced on a line. The term 'short can' does not only concern cans that do not reach standard height, but also many other defects in a can that cause jams in a horizontal press, for example: tearing off or breakage along a side wall. Some examples are presented in **Figure 5**. There are a few factors that may influence number of short cans, for example the condition of forming tools, lubricant parameters, machine adjustment, however, one of the most important is quality and parameters of an aluminium stripe. Apart from evident defects of a stripe such as inclusions or holes, such parameters as poor formability or insufficient UTS, high anisotropy may strongly increase the value of short cans. However, because of the complex nature of the phenomenon which results from many factors that influence production process at a given time period, it is important to ascertain that the particular problem is really caused by parameters of a stripe.

As a result, some beverage can producers decided to introduce a procedure of complaint that includes a 'double check'. This means that if the value of a short can exceeds the set value, a coil is recalled from the production line and placed in an isolator for non-conforming materials. After some time, usually after exchange of some shaping tools, the coil is used again. If the high level of a short can is then maintained, the production department decides to start the procedure of an external complaint.

This approach is based on cooperation with suppliers and helps to maintain positive relationship between aluminium stripe producers and their customers. In other words, suppliers may be sure that the stripe was checked more than once, and in different conditions concerning, for example, tools exchange. If the stripe causes the decrease in efficiency of the process because of jams in horizontal presses, although other factors

that may influence this phenomenon are changed, it is likely that it is the material that does not meet fixed requirement. The character of complaint procedures may be also determined by the differences in size on power of the partners. However, the procedure based on a rule of 'double check' seem to be reasonable.

Figure 5 Examples of defects that are classified as 'short cans'
(Source: Own elaboration)

4. LOGISTIC OPERATIONS SUPPORTING CAN MAKING PROCESS

Logistic operations which support can making process include operations of transportation of a coil. The standard procedure of coil transportation within the customer company starts at the moment of delivery. The first transportation usually takes place when coils are transported from a truck to the material store where they wait until the internal orders for them are issued (S1). The next operation is transportation from the material store to the transit store next to production line (S2). The third operation is realized when the coil is loaded into a feeder. If the production process lasts without any problems, logistic operations concerning the coil finish at the moment when the internal roll from the coil is removed while another coil is loaded (S3).

However, in the case of problems on presses, especially horizontal presses, and when the value of 'short cans' increases significantly (each can making producer may set its own level of acceptable value of 'short can'), some actions need to be implemented.

The first step in such cases is usually a modification of lubrication conditions or exchange of tools. However, if these actions do not bring acceptable improvement in the situation, the Production Department decides to remove the coil from the production line. However, as it was mentioned before, it is not a moment when the external complaint procedure is started (S4).

The coil is placed in an isolator with the easily visible label including such information as: date, producer, volume, description of the observed problem, and decision of a Production Department about further actions,

for example 'to recheck'. At this stage no further actions are implemented and no information is sent to any other department. This stage is fully realised only within Production Department (**Figure 7**).

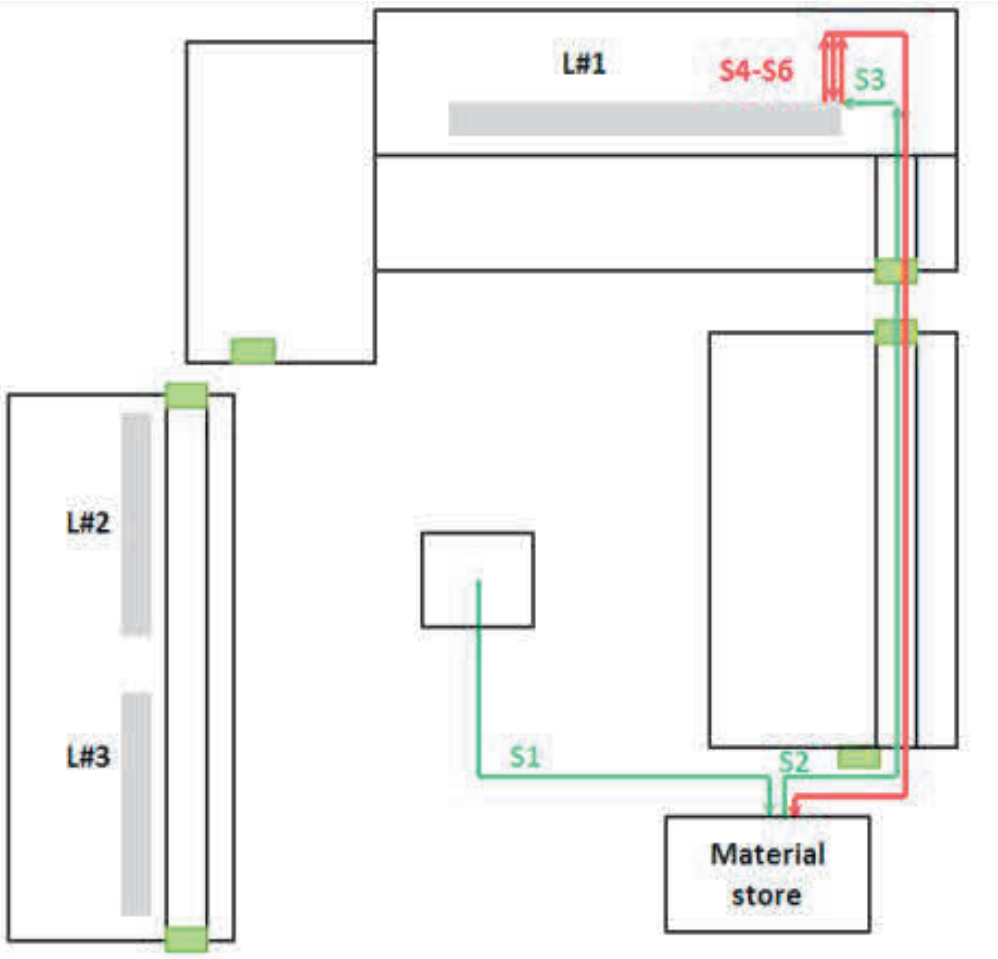

Figure 6 Scheme presenting distribution of transportation in a factory.
(Source: Own elaboration)

After this stage, and some time depending on production and maintenance plan, a coil may be reloaded on the production line (S5). If there are no significant problems, the procedure is finished at this moment. However, in the other case, the coil is removed from the production line and placed again in the isolator of non-conforming materials (S6).

At this moment the Production Foreman starts the external complaint procedure and asks for blockage of the coil in ERP system, while the Line Supervisor decides about further proposal of disposal. Then, the Purchase Department issues a Complaint Protocol to a supplier, discusses the complaint and negotiates the conditions of resolution. If there is an agreement, the Director of Purchase Department accepts its conditions. If the complaint is successfully resolved, the actions are confirmed later by a Production Manager, and further, together with correcting actions presented by a supplier in an 8D report, are approved by the Head of Factory. All the stages of an example complaint procedure are presented in **Figure 6.**

In other words, in the case of coils without evident defects, it is practiced that a coil is loaded on a production line 2 times before the complaint proceedings are started. It helps to prove non-conformity of the coil. These decisions are made internally in the Production Department. **Figure 8** presents the steps of complaint procedure concerning aluminum stripes and **Figure 7** presents a scheme of logistic operations concerning coil

transportation resulting from standard and complaint procedures in time and distance. In **Figure 7** green lines stand for logistic operations realized within standard procedures, while red color indicated those logistic operation which result from complaints.

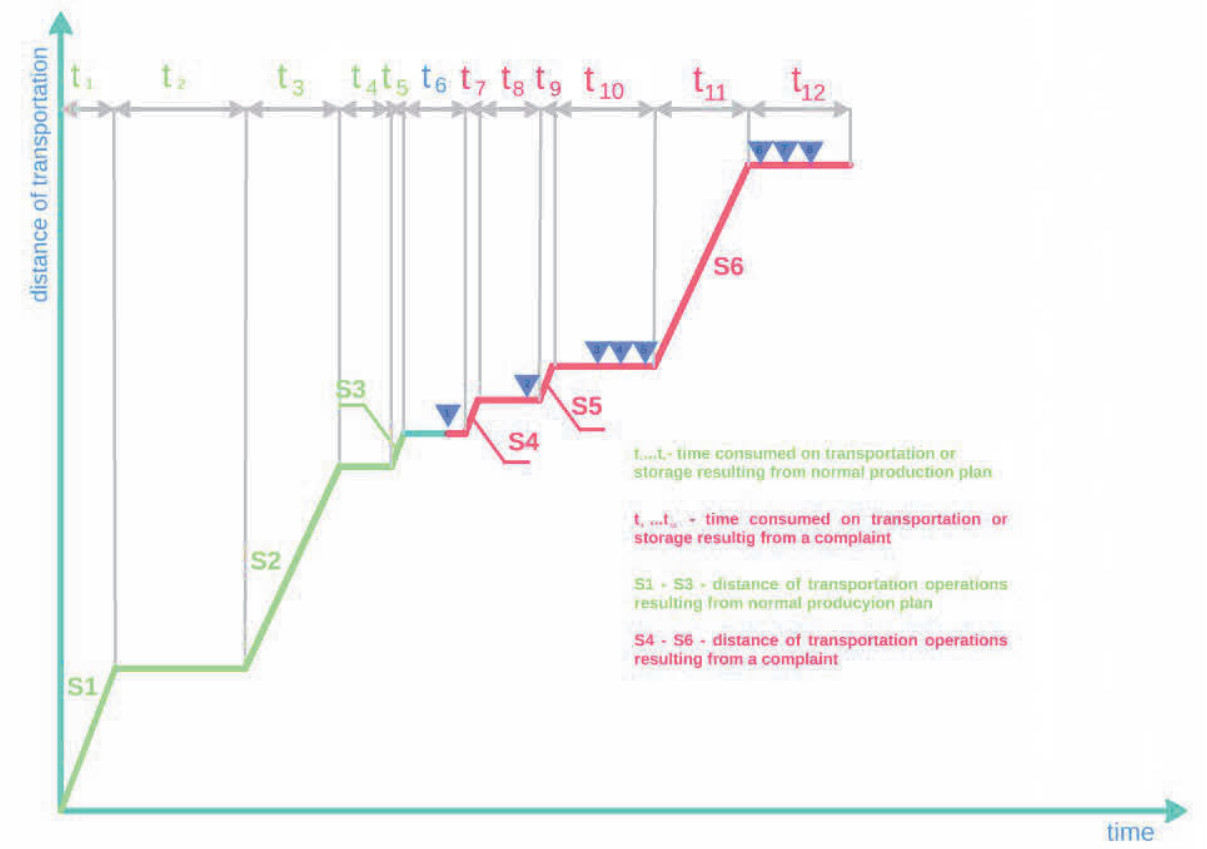

Figure 7 Scheme presenting transportation and time consumption.
(Source: Own elaboration)

As it is seen, logistic operations concerning coil transportation in the case of problems with the material on a production line exceed the number of standard logistic operation in this field. Taking into consideration the velocity of production, wasted time on a production line due to the problems, as well as the volume of a coil and the necessity of its unnecessary transportation because of the insufficient quality, it is worth considering what costs suppliers need to refund within a scope of a complaint.

5. CONCLUSION

The article presented logistic aspects of complaints concerning insufficient quality of aluminum stripes used in beverage can making process.

The schema present all additional operations of transportation of a coil due to problems during production and further complaints against a supplier of an aluminum coil. These operations are illustrated with a red color and generate additional costs that are not usually paid by a supplier who in the case of an approved complaint is obliged to cover cost of the material.

What is more, documentation connected to complaint proceedings involves workers from many departments, e.g. Production Department, Purchase Department, Head of Factory which causes additional waste of job

potential that according to Lean Management belongs to the list of ‚wastes' that ought to be eliminated from a company.

Thus, it seems to be justified to introduce a method to decrease the number of coils that cause problems during production process and negotiate conditions of resolutions with suppliers, which however may be difficult in asymmetric relationships between a supplier and can producer, when the former is a larger market player.

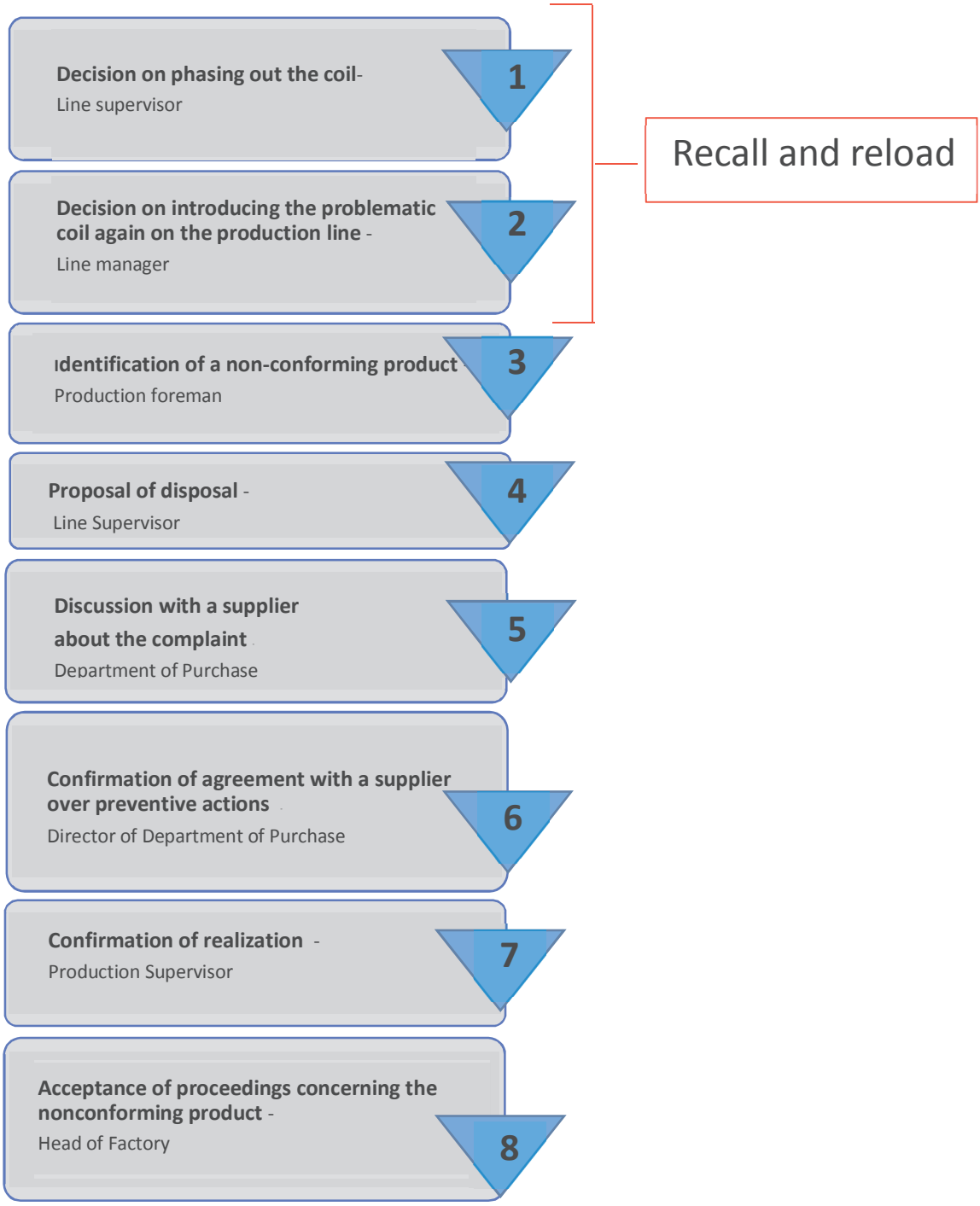

Figure 8 A scheme presenting an example of a complaint procedure concerning poor quality of a stripe resulting in the increased number of 'short cans'. (Source: Own elaboration)

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